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Encouraging the Farmer

LARGE POTENTIAL OFF-PEAK LOAD

UNTIL comparatively recently the average farmer was, in the eyes of the electrical fraternity, regarded traditionally as of a very conservative nature, averse to all change and hard to convince of the advantages of new electrical methods. With greater knowledge resulting from experience, from the cumulative effect of years of electrical propaganda and from greater opportunities on the part of the younger generation to study farming subjects in schools and agricultural colleges, this can no longer be held to be true.

The tendency towards electricity was greatly accelerated by the war. In particular the labour difficulties, not to mention the prosperity resulting from the more favourable conditions for marketing his produce, made the farmer regard electricity in a new light. To a large extent considerations of cost of securing a supply of electricity and the necessary electrically-operated appliances no longer counted: the only criterion was whether innovations would make possible or facilitate a farming operation or ease the strain on his overworked wife in the farmhouse.

Too-Limited Use

To-day this is still largely the case though with the return of the men from the Forces the man-power situation is perhaps not quite so acute and the demand for labour-saving devices not so keen. It is also a lamentable fact that many farmers, anxious enough in the first place to get their premises connected, are making only a very limited use of the facilities provided, sometimes even solely for lighting and radio.

This time of the year with its agricultural shows all over the country provides electricity supply representatives with the greatest opportunities for making or renewing their contacts with the farming community, for driving home the benefits to be derived from the use of already well-known appliances and for introducing new ones.

Off-Peak Possibilities

Having due regard to the still inadequate generating capacity, there is nothing to be said against this activity. Almost all the main applications of electricity on the farm—milking, sterilizing, bottling, hot water service, root crushing, grinding, pig and poultry food cooking, grain and grass drying, soil heating, water pumping, etc., are, or could easily be, off-peak.

There is also a good case for supplying off-peak farming supplies through a time switch at attractive rates. Specially low charges might be quoted for such purposes as the heating of grass and grain drying plants in the periods of lowest consumption during the summer, thus not only levelling up the electrical "valleys" but also helping to make these operations a truly economic proposition for the farmer: with normal charges it is only the higher prices received for the more uniform and improved products achieved by all-electric methods which make them practicable.

Every encouragement and assistance

must also be given to the farmer to acquire both his installation and his apparatus. Most if not all the Electricity Boards have schemes of hire-purchase covering all types of equipment and consideration should be given to the possible reduction or waiving of contributions or guarantees in connection with the provision of supplies. Not that the guarantees required ever need deter any farmer who really wishes to take advantage of even a few of the multitudinous electrical facilities now available to him. Upon the whole it seems to us that the Electricity Boards are taking seriously their obligation under the 1947 Act to extend their service to rural communities, in the face of many handicaps. A few days ago Alderman W. S. Lewis, chairman of the Midlands Board, said that since it took over the Board had connected more than 1,200 farms; over the whole country about 10,000 farms had been given a supply since vesting date.

CLOW PROPOSALS

PROBABLY too much stress has been laid on the surcharge-rebate aspect of the recommendations of the Clow Committee on peak-load reduction. It was the only immediately applicable remedy, however imperfect, and the Minister of Fuel and Power felt impelled to do something. In the nature of things (human nature) the surcharge was unlikely to achieve much and it was impossible to gauge how much. Mr. R. S. Edwards, a member of the Committee, complains in *The Times* that the surcharge was not given timely and vigorous publicity, but our impression is that it was introduced sufficiently well. We agree with Mr. Edwards that the Committee's other proposals for control of peak load should receive more attention. Peak reduction is important, but so is load-factor improvement which is also involved in the Committee's recommendations. What are the B.E.A. and Electricity Boards doing about it?

MIXED OPINIONS

A GOOD example of the difficulty of obtaining an overall view of electrical matters is provided by the installation industry. Electrical contractors seem to be labouring under the dread that the Boards will put them out of business by drastic cutting of prices, although there have been assurances that competition will be fair and square. Against this may be placed numerous letters to the Press from people who say that they have been charged exorbitant sums by the "B.E.A." for electrical work. We may also throw into the balance the opinion of the Electrical Trades Union that the Boards are not really trying to secure installation work, i.e., they are not under-quoting the private contractors. It looks as though the latter still have a lease of life.

G.E.C. RESULTS

THE widespread and comprehensive nature of the business of the General Electric Co., Ltd., and its subsidiaries, makes the group's annual report a faithful mirror of home and overseas conditions in the electrical business. Sales during 1948-49 remained at a high level, but the trading profit was about 9½ per cent lower. It seems that overseas trade continued to advance, but sales of consumer goods in the home market fell away. These aspects are indicated in the report which shows, first, considerable capital expenditure and, secondly, a substantial increase in stocks. Since the end of the period covered the company has issued £8 million of loan stock, largely to repay advances from the bank. Expansion of works and equipment is continuing.

ELECTRICAL STANDARDS

FOR the past forty years, the standards (ohm, ampere, volt), legalized by the Board of Trade for the measurement of electricity, for the purposes of the Weights and Measures Acts, have agreed in value with the "international" electrical units. The Ministry of Fuel and Power now announces that in future these standards must conform with the "fundamental" units (verified by the N.P.L.) for trading purposes. The change has been made by the Weights and Measures (Electrical Standards) Order, 1949, No. 1431, which becomes effective on 1st October next, cancelling a similar Order of 1910. The only real difference relates to the temperature of the insulated wire for the purpose of the measurement of the ohm, which has been reduced to 14.9 deg C, a drop of two degrees.

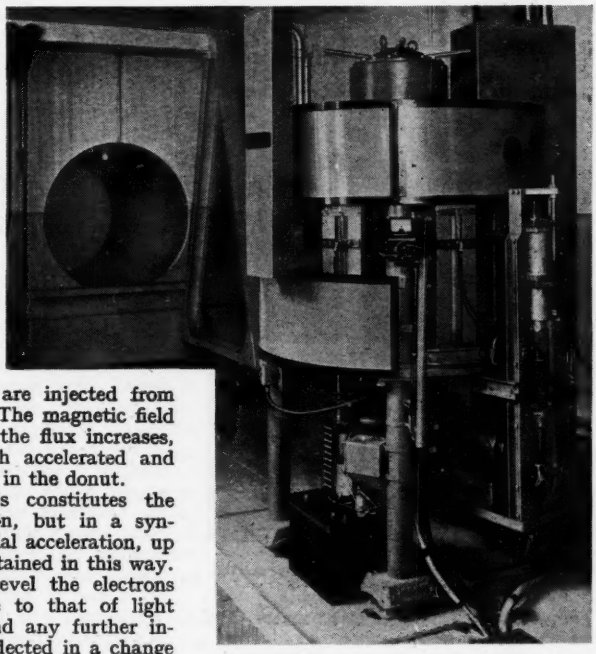
Hospital Synchrotron

Thirty Million Volt X-Ray Generator for Medical Use

By J. H. MARTIN*, B.Sc., Ph.D.

THE installation of the first of two 30 MeV synchrotrons designed for the Medical Research Council has just been completed at the Royal Cancer Hospital, London. It is believed to be the only one of its kind in the world.

In the conventional X-ray apparatus electrons are accelerated by a large potential difference between the cathode and anode. For potentials above one million volts the construction of such an X-ray tube and generator involves many difficulties. The synchrotron avoids the problems associated with that kind of apparatus. It consists of a large a.c. magnet and is somewhat similar to a high voltage transformer, the familiar secondary coil being replaced by an evacuated glass annulus, the "donut,"



Three-ton synchrotron X-ray accelerator in London Hospital, showing (left) "black body" ray-stopping cavity

into which electrons are injected from an electron "gun." The magnetic field is so shaped that, as the flux increases, the electrons are both accelerated and held in a circular orbit in the donut.

In a betatron this constitutes the method of acceleration, but in a synchrotron only the initial acceleration, up to about 4 MeV, is obtained in this way. At such an energy level the electrons have a velocity close to that of light (0.992c at 4 MeV) and any further increase in energy is reflected in a change of mass rather than of velocity. It is, therefore, possible to arrange an electric field to vary in synchronism with the rotating electrons. This field provides the final stage of acceleration in the synchrotron and is obtained from a quarter wave radio-frequency resonator formed into a hollow cylinder through which the electrons pass. The electrons make something like two million revolutions in the donut and consequently a small energy increment (say 10 eV) imparted during each revolution is sufficient to increase their final energy by a substantial amount.

The action of switching off the radio-frequency accelerating voltage before the peak magnetic field is reached causes the electron orbit to shrink on to a target mounted in the donut, thereby producing X-rays.

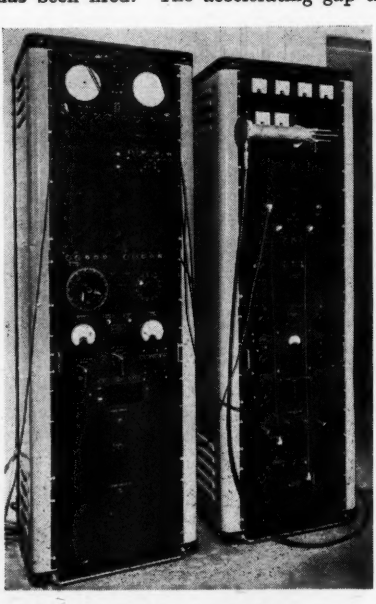
The instrument installed at the Royal

*Physics Dept., Royal Cancer Hospital, London.

Cancer Hospital is of compact design, the magnet having eight C-shaped yokes and forming a cylinder of some 4 ft diameter weighing about 3 tons. A peak field of 10,000 gauss is obtained, the coil current then being approximately 160 A. The magnet is excited continuously from the 50 c/s mains by a resonant circuit carrying a reactive power of some 1,500 kVA.

The electrons are injected, immediately after zero field, for about 5 micro-seconds at 10 kV. Improved gun design will enable higher injection voltages (up to 100 kV) to be used later, yielding, it is hoped, higher X-ray outputs.

The radio-frequency resonator is made of "Faradex" (dielectric constant=80) on to which a conducting silver coating has been fired. The accelerating gap is



Control and monitoring panels in a protected observation cabin

burned by an arc. The resonator is so short that it need not be moulded to a circular shape, as is necessary when using air as the dielectric. It is excited at 488 Mc/s, some 30 W peak power being supplied. The target in this machine is a tungsten wire of approximately 2 mm diameter, mounted vertically in the donut.

In order to ease the problem of providing protection against the X-radiation produced, the apparatus has been installed in a basement laboratory. Owing to a new mechanism of absorption of radiation, which becomes operative above about 1 MeV, the need for protection is not so acute as might be supposed. The X-ray beam is "fired" into a "black body" cut, at a depth of about 8ft, in a mound of earth 20ft long. Although incorporated in later designs, in this machine no provision has been made for moving the machine and thus altering the direction of the beam. Patients to be treated will be placed, at a distance of 1 metre from the target, on a couch specially designed with a range of movement. Protective walls, 3ft thick, of a special concrete brick have been built at the side and rear of the synchrotron. The machine and any patients or apparatus may be watched from the control cabin through a 3ft long tank of water sealed into the rear protective wall.

The instrument, which is installed in the Physics Department of the hospital, under Professor W. V. Mayneord, will be used as part of an investigation of the applications of nuclear physics to medicine.

Studies to be Undertaken

The efficacy of the protective measures will first be investigated, then the apparatus will be used to study the physical properties of the radiation produced, their intensity, penetration and interaction with various materials. Studies will have to be made of the shape of the X-ray beam, which at such high energies tends to be concentrated in a narrow angle in the forward direction; the nature of the radiations emitted, it being known that besides X-rays a large number of electrons escape from the donut; and methods of collimating the beam and of obtaining an even field of irradiation. The distribution of the radiation under various conditions of filtration, etc., inside a volume of water (water being a "tissue-like" material) will also be measured and studied.

Preliminary work, soon to be published, carried out by Professor Mayneord

and the writer with betatrons, synchrotrons and linear accelerators in Great Britain and America, has provided much useful information on these matters and materially assisted the planning of the physics programme.

These physical studies will be followed by investigation of the biological effects of the rays on a number of organisms, animals and specific tissues. Finally, the synchrotron will be used in the treatment of patients, having cancer in sites at which the special properties of the rays are considered to have advantages. To this end it will be necessary to investigate by the use of models the amount of radiation reaching various parts of the body and to devise suitable equipment to direct and control the amount of X-rays applied. It will probably, therefore, be several months before treatment can commence.

The scientific development of the apparatus has been largely due to a section of the Telecommunications Research Establishment, Great Malvern, now part of the Atomic Energy Research Establishment, Harwell. The magnet and much of the electrical gear have been designed and built by the English Electric Co., Ltd., Stafford, in consultation with T.R.E., which is also responsible for the electronics aspect of the design. Development costs of this unit and the next one, which will go to the Department of Radiotherapeutics at the University of Cambridge, have been borne by the Medical Research Council and the Royal Cancer Hospital has undertaken the cost of providing the laboratories.

De-rating of Testing Premises

By F. E. SUGDEN, A.C.I.S., Barrister-at-Law

IT is essential that electrical goods shall be tested before being sold if the makers are to preserve their reputation. The testing may be done in the factory or in separate premises, and the question arose recently whether such premises are entitled to be de-rated in accordance with the Rating and Valuation (Apportionment) Act, 1928. The point is an important one, for it means the reduction of the rateable value to one-quarter of the amount which would operate if the premises were not de-rated.

The case put to the Court of Appeal was as follows: A manufacturing company used certain premises for the testing of machines before delivery to purchasers. Any machines which showed faults during the test were sent back to the works for adjustment. When sent for testing the machines were assembled on the premises in question and were dismantled after testing. Minor faults were corrected on the premises.

The firm contended that the testing was part of the manufacture of the goods and as a consequence thereof the premises should be de-rated. The Lord Chief Justice, Lord Goddard, agreed that the work performed on the premises in testing the goods before despatch was part of, or was incidental to, the process of making an article satisfactory and therefore the premises were an industrial hereditament within Section 3, Subsection 1, of the Act of 1928, and were entitled to be de-rated.

The point was amplified by Mr. Justice Finnemore, another member of the Court, who stated that he considered that it could also be said that testing was incidental to the adapting for sale of an article. The testing process was not carried out just to see whether goods were ready to be sold, it was part of the manufacture to ensure that the articles were being made properly in accordance with the contract and in accordance with the obligations which the Sale of Goods Act, 1893, placed on manufacturers. As a consequence thereof he thought it was quite right that the premises in question should be deemed to be an industrial hereditament and entitled to be de-rated.

Douglas Extensions

Application is being made by Douglas (I.O.M.) Corporation for sanction to borrow £26,280 for extensions of transformers, switchgear and mains required for the Willaston housing estate and for the ordinary extensions for the current year.

Views on the News

By REFLECTOR

THE question of gas or electrical equipment for new houses continues to exercise the minds of local councils. A proposal made by the York Housing Committee that 30 per cent of the cookers in some new flats should be gas and 70 per cent electric, was referred back at the City Council meeting last week. It was stated that the Committee was only "perpetuating" what it had done in the past on other housing estates and it was trying to save a little on housing costs. The latter is a cogent argument for electricity even though the former reason is debatable. Tenants should not be dictated to but given a fair choice even if they are misguided enough to choose wrongly. I wonder whether the proportions settled for earlier estates have proved acceptable. If so, perhaps the Housing Committee *was* providing a fair choice.

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Electricity's culpability in the matter of burns has been put into its right perspective in an article appearing in the *Lancet*. An analysis of the first 1,000 cases of burns and scalds admitted to the Medical Research Council's Burns Unit at Birmingham Accident Hospital from 1945 to August, 1948, shows that 699 cases occurred in the home and 360 of them were burns. Of 189 cases resulting from direct or indirect contact with domestic fires 39 were attributable to electric fires, all but one of which were unguarded; 7 cases were fatal. Compared with these figures there were 110 cases caused by coal fires (102 unguarded, 15 fatal), and 31 cases caused by gas fires (30 unguarded, 6 fatal). In addition there were 9 unspecified cases (4 fatal). Of the 171 home burns attributed to other causes electricity was held responsible for 16 (one fatal).

★ ★ ★

Particular attention is drawn in the same article to the dangers of the panel type of gas and electric fires flush with the wall. When facts emphasizing the risks of unguarded fires have been presented to the manufacturers, the authors say that they have usually been met with the contention that the guards would detract from the appearance and efficiency of the fires and therefore from the sales. Tests of efficiency have shown conclusively that a light guard at a few inches from the element makes little difference to the radiation effect, and a well-designed guard need not detract from the appearance. In the matter of sales values, possibly if the public was plainly told of the danger of these unguarded fires the provision of safeguards would quickly come to be a selling feature. If the manufacturers will not show themselves sufficiently concerned about the public safety, the sale of these fires should, the authors suggest, be the subject of specific safety regulations analogous to those which protect the public against the indiscriminate sale of dangerous drugs and poisons. Would this object not be achieved by attachment of the B.S.I./E.D.A. "mark" of approval?

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A few weeks ago, referring to the report of the Royal Commission on Population, I suggested somewhat flippantly that, instead of increasing the children's allowances as recommended, mothers might be presented with pieces of electrical apparatus as a reward for performing their duty to the nation. Now I find that this is in fact being done already. Someone of my acquaintance tells me that she is using her family allowance to pay the hire-purchase instalments on a refrigerator. What better use could she make of the money to safeguard the health of her children?

★ ★ ★

I read that at a recent meeting of the North-Western Electricity Consultative Council, complaints were received about the delay in the standardization of electricity charges in the area. I am all in favour of uniform charges, but I anticipate further complaints when they are standardized, for levelling must mean that some people will pay more. When consumers clamour for standardization, it is certain that they believe that they will get their electricity cheaper.

Light-Metal Conduit

ALUMINIUM-ALLOY TUBING AND ZINC-ALLOY FITTINGS

THE memorandum on this subject recently issued by the I.E.E. on behalf of its Wiring Regulations Committee is a useful contribution to a controversy that was bound to result from the introduction of newer metals into a system in which iron and steel have been dominant for fifty years.

The memorandum (*Electrical Review*, 6th May, 1949) rightly suggests certain precautions, which are not difficult to observe. They and the further information given below may help consultants and contractors to decide for which of their wiring jobs these non-ferrous types may safely be used.

These notes, prepared by Simplex Electric Co., Ltd., in collaboration with Tube Investments, Ltd., Department of Development and Research, relate only to aluminium-alloy conduit and zinc-alloy fittings, for the reason that the production of aluminium-alloy fittings has been comparatively small and continuance of their use seems doubtful.

How it was Introduced

It will be helpful to recall the factors which led to the introduction of aluminium to the installation field. On the termination of war contracts there were large surplus stores of aluminium tube and a vast manufacturing capacity for zinc-alloy die casting, whereas there was an extreme shortage of steel conduit and iron castings, which has persisted until quite recently. Zinc-alloy die casters, desperately in need of new markets, were attracted to the starved conduit fittings trade and many of them, without knowledge of the fundamental design requirements, produced large quantities of fittings unsuitable for their purpose and of very inferior quality.

A large proportion of the war surplus aluminium tube was made of alloys quite unsuited to conduit purposes, but the shortage of steel conduit and malleable iron fittings practically compelled contractors who had urgent work in hand to make use of unsatisfactory substitutes.

It is not surprising, therefore, that some prejudice has developed against aluminium and zinc-alloy for installation purposes, but it would be unjust to adopt the same attitude towards the latest alloys. Old-established manufacturers are vitally concerned to satisfy the requirements of the electrical industry and are most unlikely to market any lines that would be detrimental to their reputation. The alloys now used have been proved by experiment to be suited to their purpose and, moreover, zinc-alloy die castings have been used for many years, with entire satisfaction, in some of the smaller lines of so-called "ironclad" switchgear and for the canopies of lighting reflectors. Both, as with a conduit system, are commonly installed in situations where mechanical strength, effective continuity and anti-corrosive properties are essential: there is no fundamental difference. The extended use of diecast fittings of correct design and made of suitable zinc-alloys is therefore a logical development.

The large scale use of aluminium for the manufacture of conduit in this country is, however, a comparatively recent innovation, although it was used on an important Government project even before the outbreak of war and it has been manufactured and marketed in Canada for some years, having been approved by the Canadian Standards Association and endorsed in the Canadian Electrical Code.

Results of Tests

Tests of a very comprehensive nature have shown that the mechanical strength of aluminium-alloy conduit is approximately 50 per cent of that of steel of equivalent gauge. Similar tests of well-designed zinc-alloy fittings diecast from "Mazak III" (B.S. 1004A) show that they have a strength approximately 33⅓ per cent that of equivalent malleable iron fittings. In addition to these tensile tests, research is in progress on conduit fittings assemblies to ascertain their corrosion resistance under varying conditions of service. The full significance of the results of such tests can only be assessed

after a long period, but enough data have already been obtained to justify a reasonably long-term forecast.

The figures in the table relate to the exposure of conduit and fittings assemblies for a period of nine months and, although a much longer period will be necessary for conclusive evidence the comparative figures already obtained indicate that the aluminium/Mazak units will ultimately prove to be at least as reliable as steel/malleable iron combinations in the situations in which they are operating.

The non-ferrous assemblies are "self-colour," without protective coating, but the ferrous assemblies are black-enamelled. All screw threads are unprotected, except for normal male to female engagement.

CORROSION AND RESISTANCE TESTS
Duration October to June

Situation	Corrosion after 9 months	Resistance Tests (Ohm)	
		Initial Test	After 9 months
Electrical laboratory (indoors)	Nil	0.00125	0.00082
Railway loco. shed (indoors)	Very slight	0.00223	0.00690
Outside on roof of building in industrial area (exposed)	Nil, but some discoloration	0.00151	0.00239
Near pickling plant in cold drawing tube mill (indoors)	Slight	0.00225	0.00103
Near furnace in hot tube mill (indoors)	Nil	0.00133	0.00216
Near the sea shore on the Welsh coast (exposed)	Nil, but slightly discolored	0.00290	after 6 mths. 0.00404

The maximum initial resistance permitted by B.S.31(1940) for an equivalent steel conduit/malleable iron assembly is 0.015 ohm.

Similar assemblies (of black enamelled steel conduit and self colour Mazak fittings) are undergoing identical tests for purposes of comparison and up to date show the same tendencies as the aluminium/Mazak groups as regards continuity, except in the sea shore test, in which case the ohmic resistance is rising steadily.

The I.E.E. memorandum states that aluminium and zinc base alloys may be subject to corrosive attack in "moist saline atmospheres." This suggestion is not borne out in the case of the alloys now under review. The testing period has necessarily been short, but the sea shore test is encouraging. Another test (not recorded) and much more severe has, so far, been equally reassuring; this test assembly is installed on the South Coast in such a position as to be covered at each high tide and exposed to the sea air at low tide. After nine months there is discoloration, but no sign of corrosion.

From the foregoing it is reasonable to assume that aluminium conduit in combination with zinc-alloy diecast fittings, of first-class alloys and design, can be used with confidence in all normal installations. Their low tensile strength, however, must be recognized and where heavy mechanical protection is needed for the cables or a high rate of vibration may occur, steel conduit and malleable iron fittings should be used.

When applying screw-threads to aluminium conduit the dies and chasers should be sharp and free from swarf. The thread should be cut in one continuous movement, without "backing off." A 50/50 mixture of mineral oil and paraffin is a satisfactory lubricant. To avoid undue marking tubes should be held in *plain* jaw vice grips, shaped to a diameter a little greater than that of the tubes to be held. Earthing grips and bushes of copper or brass should be cadmium-plated and malleable iron earthing grips "Sherardized." Conduit saddles may be of Mazak, "Sherardized" malleable iron, or "Sherardized" steel.

All screws, including those in inspection fittings, should preferably be "Sherardized" steel, but brass screws may be used provided they are cadmium-plated. Similarly, integral earthing screws and clamping washers fitted to aluminium or zinc-alloy boxes, etc., require to be cadmium-plated. In cases in which the domed covers of junction boxes are to support heavy reflectors or lanterns the boxes and covers should be of malleable iron, while for down-tubes and brackets steel conduit must be considered essential.

In spite of the assurance engendered by the table, many engineers prefer steel conduit for all installations, but are in doubt about the suitability of Mazak fittings when used in conjunction with steel. The results of tests now in progress will be reported in the near future, but it can already be stated that in the indoor situations the steel/Mazak assemblies show no signs of undue deterioration in appearance and continuity tests are satisfactory up to the present.

PERSONAL and SOCIAL

News of Men and Women of the Industry

AFTER the recent general meeting of the **British Power Press Manufacturers' Association,** the following officers were appointed for the session 1949-50: Chairman, Mr. Henry D. Challen, A.M.I.Mech.E. (Taylor & Challen, Ltd.). Vice-chairmen, Messrs. A. E. Whyman (E. W. Bliss (England), Ltd.), R. B. Moon (Moon Brothers, Ltd.), W. S. Rhodes (Joseph Rhodes & Sons, Ltd.), and E. C. Seed (Cowlishaw, Walker & Co., Ltd.). The secretary is Mr. G. T. Beach.

Mr. E. Mills, A.M.I.E.E., has been appointed district engineer in the Cheltenham District of the Midlands Electricity Board. Following service in the Contract Department of Callender's Cable & Construction Co., he was for six years the senior distribution assistant with the Ealing Corporation Electricity Department, and was appointed deputy mains engineer in the former Cheltenham undertaking in March, 1947.

Mr. J. W. Shannon, manager of the Glasgow branch of the Simplex Electric Co., Ltd., will for the time being be responsible for the company's Edinburgh branch in place of Mr. F. Nash, Edinburgh branch manager, whose death is recorded in our Obituary section.

Mr. S. L. Crafford has been appointed manager of the Colchester Branch of W. T. Henley's Telegraph Works Co., Ltd., as from 1st July last.

Mr. F. C. F. Phillips, of the Telephone Transmission Laboratory, G.E.C. Telephone Works, Coventry, has been awarded the Marconi Premium by the British Institution of Radio Engineers for the most outstanding engineering paper published in the Institution's Journal during 1948. Mr. Phillip's paper was on a "Direct Reading Frequency Measuring Set," and he will receive his award (value ten guineas) on 22nd September next.

Mr. K. N. Eckhard, M.I.E.E., M.Inst.T., M.I.Loc.E., retired from active service as chief electrical engineer of the F.C.N. General Bartolomé Mitre (ex-Central Argentine Railway) on 31st July. Under Mr. Eckhard's direction the completion of the electrification of the lines that serve the northern suburbs of Buenos Aires was successfully planned and carried out. He started his electrical engineering career as a pupil in the firm of Spagnoletti, Ltd., and later served an apprenticeship with the London United Tramways. In 1909 he joined the London Electric Railway Co. as an assistant in the Mechanical Department. In 1912 he went to Argentina, and after working on various tramway and electrical projects in Tucumán and Buenos Aires,

The inaugural meeting of the Yorkshire (No. 10) District Joint Advisory Council was held on 1st July when the accompanying picture was taken

Standing (left to right): Mr. C. Evison (C. & A.W.U.); Counc. H. E. Matthews (N.U.G. & M.W.); Mr. W. A. Wallis (E.T.U.); Mr. G. H. Sammons (A.M.E.E.); Mr. A. Haselhurst (representing Mr. W. M. Lapper, chairman, Yorkshire Electricity Board); Mr. F. Newey (deputy chairman, Y.E.B.); Mr. C. F. Walkland (secretary, Yorkshire Division); Mr. C. G. Richards (chief generation engineer (Op), Yorkshire Division); Mr. A. Packer (representing Mr. D. Bellamy, sub-area manager, Y.E.B.); Mr. R. D. V. Roberts (secretary, N.J.A.C.); Mr. F. Nicholls (sub-area manager, Y.E.B.); Mr. J. M. Dodds (secretary, Y.E.B.); Counc. H. Fairbotham (Y.E.B.). Kneeling (left to right): Counc. J. W. Wallbanks (E. & F.U.); Mrs. M. I. Leake; Mr. H. Madden (secretary Yorks (No. 10) D.J.A.C.); Mr. S. Wade (T. & G.W.U.); Mr. G. A. Vowles (chairman, Yorks (No. 10) D.J.A.C.); Ald. T. A. Jessop (A.E.U.); Mr. R. Hodgson (N.A.L.G.O.); and Mr. K. W. Coupe (representing Mr. E. Hansom, E.P.E.A.).

joined the Central Argentine Railway in 1913, when the work on the electrification of the line between Buenos Aires and Tigre C. was being commenced. In 1920 he was appointed resident engineer in charge of the electrification section of the Mechanical Department, and when in 1926 that section was converted into a separate department, he was appointed chief electrical engineer.

In view of its expanding activities in the diesel engine field for traction, industrial and marine applications, the English Electric Co. announces the appointment of **Mr. A. V. Wilkin** as general manager of the newly formed diesel engine division, with headquarters at Rugby. After practical training with Sandycroft, Ltd., Mr. Wilkin was for some years with the London organization of Ruston & Hornsby, Ltd., and in 1932 entered the service of Belliss & Morcom, Ltd., in their diesel Engine Department. In 1943 he joined the English Electric Co. as manager of the Diesel Engine Sales Department, and has thus spent the whole of his business life in the diesel engine world. He is a member of the Institute of Fuel and of the Council of the British Internal Combustion Engine Manufacturers' Association.

Mr. A. V. Wilkin

Mr. Evan D. Davies, B.Sc., A.M.Inst.C.E., A.M.I.E.E., Barrister-at-Law, has recently been elected a member of the Council for the Preservation of Rural Wales. Mr. Davies is a transmission section engineer with the British Electricity Authority in Cardiff and was for 17 years section engineer with the Central Electricity Board. Before this he was employed by Siemens Bros., the Air Ministry and the South Wales Power Co.

Mr. S. D. T. Henderson has been appointed sales manager of the Radio Division of the Telegraph Condenser Co., Ltd., and **Mr. W. H. Sternefeld,** who recently joined the company in another capacity, has been appointed overseas sales manager. **Mr. R. H. Nunn** has joined the company's sales organization to look after sales to the distributive trades for radio constructors and replacement purposes.

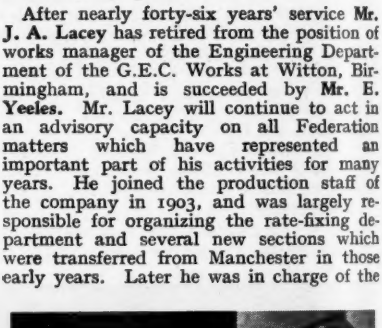
In February last the Gauge & Tool Makers' Association announced a scheme for award under certain conditions of a certificate of craftsmanship, and applications were invited from engineers who had served a toolmaking apprenticeship and had also passed the final examination of the City & Guilds Machine Shop Engineering Course. A number of applications have been received during the past six months, but the first successful candidate is **Mr. Ivor Jones**, an employee of A. C. Wickman, Ltd., Coventry. At the next quarterly luncheon of the Association, which will be held at the Savoy Hotel, London, Lord Brabazon of Tara, the principal guest, will present the certificate.

Mr. C. Cameron-Kirby, M.Inst.C.E., M.I.E.E., M.I.Mech.E., deputy manager of the Kent Sub-Area of the South Eastern Electricity Board has been elected president of the Association of Managerial Electrical Executives for the year 1949-50.

Mr. F. C. Z. Crosse has been appointed to the board of Measurement, Ltd.

Mr. J. W. Angus has been appointed managing director of Hipprum Wires, Ltd., as from 9th July last.

After nearly forty-six years' service **Mr. J. A. Lacey** has retired from the position of works manager of the Engineering Department of the G.E.C. Works at Witton, Birmingham, and is succeeded by **Mr. E. Yeeles.** Mr. Lacey will continue to act in an advisory capacity on all Federation matters which have represented an important part of his activities for many years. He joined the production staff of the company in 1903, and was largely responsible for organizing the rate-fixing department and several new sections which were transferred from Manchester in those early years. Later he was in charge of the cost department which was built up under his guidance, relinquishing this post to give his attention to production methods. In 1942 he was appointed works manager of the Engineering Department, and served on the



Mr. J. J. Gracie, general manager of the G.E.C. Witton Works, wishes Mr. J. A. Lacey good luck on his retirement

Witton Management Committee until his recent retirement. He is a past president of the Institute of Cost and Works Accountants and a member of the Institute of British Foundrymen. On 14th July Mr. J. J. Gracie, general manager of the company's Witton Engineering Works, presented Mr. Lacey with two oak bookcases and a combined oak bureau and bookcase as a mark of the esteem in which he is held by his many friends and colleagues. He also handed to him an autograph album containing their signatures.

Mr. C. A. Jones who has been associated with Pearce Signs, Ltd., for nineteen years, recently as estimating manager, has joined Courtney, Pope (Electrical), Ltd., as manager of the Cold Cathode and Signs Division.

Mr. M. C. Timms, who retired from the "Telcon" organization last March, is now associated with Preece, Cardew & Rider in an advisory capacity.

Obituary

Mr. Preston Millar.—The death occurred in New York on 17th June of Mr. Preston Strong Millar. Mr. Millar, who was president of the Electrical Testing Laboratories, Inc., was widely known in America and in other countries for his work in connection with the utilization of electricity and in illuminating engineering. He was born in 1880 and his whole life was devoted to testing laboratory work and illuminating engineering. He was one of the founders of the American I.E.S. and a member of the British society. For nearly half a century he was one of the outstanding personalities in the lighting field and though he made contributions in many aspects of lighting he was particularly well known for his work in the fields of light measurement and street lighting. He took an active part in the work of the International Commission on Illumination and as president of the American National Illumination Committee he led the American delegation at the International meeting in Paris last summer.

Mr. S. Hunt.—The death occurred suddenly on 18th July at the age of sixty-seven at his home at Lyme Regis, of Mr. S. Hunt, A.M.I.E.E., M.B.H.I., who was meter superintendent of Central London Electricity, Ltd., for many years until his retirement in June, 1945.

Mr. Frank Nash, manager since 1935 of the Edinburgh branch of the Simplex Electric Co., Ltd., met his death in a motoring accident on 1st August, when the car in which he was travelling crashed into a bollard in Leith Walk, Edinburgh. Mr. Nash was a member of the Edinburgh Electrical Society, the Edinburgh Electrical Industry Golf Club—of which he was secretary for twenty-one years—the Electrical Industries Benevolent Association and the Walton Angling Club. He was past president and founder of the Edinburgh Electrical Industries Angling Association. Mr. F. G. Nesbitt, London director, represented the board of the Simplex Co. at the funeral which took place in Edinburgh on 5th August.

Wills

Mr. D. W. Cherry, executive engineer, G.P.O., who died on 28th March, left £6,080 gross (£4,439 net).

Mr. F. A. Nield, M.I.E.E., of Willingdon, Eastbourne, who died on 29th March last, left £1,642 gross (£1,584 net).

Mr. W. Dean, chairman and managing director of W. H. Dean & Son, Ltd., and a director of Burco, Ltd., who died on 11th March last, left £291,905 gross (£289,667 net).

Mr. A. MacKenzie, a director of Dowsing Co. (Electrical Manufacturers), Ltd., who died on 16th March last, left £6,704 gross in Great Britain (£6,652 net).

Major D. G. C. Murphy, former sales manager of the Cardiff branch of the British Thomson-Houston Co., Ltd., who died on 9th May last, left £336.

Mr. W. Nithsdale, B.Sc., M.I.Mech.E., M.I.N.A., M.I.Mar.E., consulting engineer, for many years resident director in charge of the Hartlepool works of Richardsons, Westgarth & Co., Ltd., who died on 10th May last, left £14,997 gross (£12,404 net).

Mr. J. G. Bomford, of Booth & Bomford, Ltd., electrical contractors, Cardiff and Evesham, who died on 14th March last, left £12,234 gross (£11,936 net).

Telephone Line Protection

AT the forthcoming conference of the International Union of Producers and Distributors of Electrical Energy at Brussels the General Post Office is showing a film recording the tests made in Huntingdonshire in conjunction with the Eastern Electricity Board to determine the effect of dropping a live power wire on to overhead telephone lines. (*Electrical Review*, 22nd July, page 163.)

The camera, running at high speed, photographed the power wire as it fell and made contact with the telephone wires. The film is projected at normal speed and hence shows in slow motion the flashes and burning through of the telephone wires during each of the three tests.

The film is a unique record of collaboration by the Post Office with the electricity authorities to find a solution to a problem which faces telephone and power authorities throughout the world.

European Electricity

O.E.E.C. Report

THE Organization for European Economic Co-operation has published a report dealing with problems relating to the increase and co-ordination of production of electricity among participating countries (H.M. Stationery Office, price 1s). The Report deals with the shortage of power and the problems of carrying out the recovery programme. Annexes give an estimate of the power deficit, production capacities and lists of power stations and a summary of national recovery programmes of O.E.E.C. countries.

In pre-war years the electricity industry in Europe went through a phase of development and concentration. But, during the war, production capacity decreased and work ceased on construction of new power stations. Since the war there has been a large increase in demand and as a consequence every country in Europe is faced with a serious gap between production capacity and demand.

The additional power required by mid-1952 is estimated at about 20 million kW. Of this total, new construction under national programmes will leave a deficit of some 4 to 5 million kW, representing 16,600 million kWh annually. In addition to national power stations, however, the construction of certain "international power stations" is contemplated. A complementary programme consists of stations which individual countries consider as essential to their development plans but which these countries will probably not be able to complete without being afforded special financial assistance.

The power plants planned under the "international" and "complementary" programmes will have a total capacity of about 7.8 million kW with an annual output of 28.2 million kWh; the cost is put at $1,949 million. The deficit mentioned above should, therefore, be covered, but it will be necessary to continue restrictions on consumption in order to avoid interference with industrial production.

There exists a comparative shortage of transmission line capacity, particularly regarding interconnections through frontiers. Co-ordination for the improved utilization of generating facilities and power resources is being implemented through the Electric Energy Committee of the Economic Commission for Europe and by means of bilateral agreements. The capacity of certain power lines will be improved to make possible the transmission of more energy along the existing 220 kV lines.

At present there exist transmission facilities for the transfer of power between Austria and the Bizone; Austria and Italy, the Bizone and France; Benelux and Switzerland; Switzerland and France; Switzerland and Italy; and France and Benelux. Additional lines will connect Italy and France; the Bizone and Benelux; France and Benelux; Sweden and Denmark. Negotiations are proceeding for the interconnection of the power systems of Austria and Switzerland, and of Norway and Sweden. The construction of new high-voltage lines was being delayed by a shortage of certain construction materials when the report was written, but Europe is in a position to produce by far the greater part of the equipment needed for the development of her electricity programme.

In general, the cost of electricity production is covered by the prices charged to consumers, but the cost of replacement and new construction requires considerable investment of new capital over a long-term period.

Domestic Appliances

S.E. Board's Hire-Purchase Scheme

ON 2nd August the South Eastern Electricity Board introduced an Area-wide hire-purchase scheme for domestic apparatus which supersedes the schemes previously in operation in some districts and extends hire purchase to the other districts in which hire purchase was formerly not available. Apparatus offered under the new scheme comprises cookers, immersion and storage water heaters, refrigerators, washboilers, washing machines, vacuum cleaners, floor polishers and kettles when a cooker is being hire purchased at the same time. Less expensive types of apparatus and space heating apparatus are not included in the scheme.

For most kinds of apparatus the maximum hire-purchase period has been limited for the present to three years. Initially the makes and models of cookers to be sold under the scheme will also be limited, but both this limitation and the limitation of maximum period will be subject to alteration in the light of experience.

Terms for cooker hire purchase are from £2 13s 6d per quarter upwards depending on the make and model, and include installation and wiring, and maintenance. Apart from cookers for which maintenance by the Board is optional, maintenance of other kinds of apparatus is the responsibility of the hirer.

Publicity for the scheme will be by leaflets for general distribution and later by posters. For the present Press advertisements will not be used.

Cable Short Circuit Ratings

Are Earth Fault Currents the Dominating Factor?

By
E. A. BEAVIS

THE interconnecting of very large generating stations to safeguard continuity of service and the consequential increase in the bulk transmission of power, has necessitated the most careful consideration of the adequacy of the rupturing capacity of all switchgear and other associated plant. In this respect the cable feeders and distribution networks play a most important part, it being essential that they shall have sufficient current carrying capacity to match the maximum short circuit kVA of the system to which they are connected, without suffering in the process any undue strain or deterioration whatever. It is generally accepted that most cable installations of reasonably large section (say 0.2 sq in and above) usually have ample margin in this respect, but with smaller sizes (particularly those of less than 0.1 sq in area) fault conditions may prove of more serious concern. This is especially so when cables for comparatively light loads are supplied from bus-bars of heavy output. In such cases the size of conductor required should not be governed by the load demand, but by the short circuit rating necessary, although as a consequence the cable may operate somewhat uneconomically from the point of view of power supply.

The short circuit rating represents the largest current which the cable can be expected to withstand, on occasions, without detriment for the defined period of time (time of current breaker operation on a fault). This current is determined mainly by the maximum permissible temperature, at the same time taking into consideration the effects of mechanical stress due to rapid expansion and the force of magnetic repulsion between the conductors within the cable. At present the limiting conductor temperature has been set at 120 deg C and the ratings for symmetrical short circuit have been based on what is presumed to be the most severe conditions (interphase faults occurring at maximum load) thereby permitting only a 50 deg C rise (from 70 to 120 deg C) during the short circuit period.

$$I = \frac{A\ 14.7 \times 10^4}{\sqrt{t}} \left[\log_e \frac{1 + a(\theta + \theta_0 - 20)}{1 + a(\theta_0 - 20)}\right]^{\frac{1}{2}} \quad \ldots \quad \ldots \quad (3)$$

The short circuit current is obtained from the general formula for the temperature rise of a conductor, assuming that all heat is absorbed by the metal during the period concerned.

If θ in deg C is the temperature rise of the conductor when carrying the short circuit current I amperes after t seconds, then $\theta = \frac{e^{Yt} - 1}{a}$ and $Y = \frac{I^2.R_0 a}{4.186\ SW}$ .. (1) where R_0 is the conductor resistance at the commencement of short circuit when the initial temperature is θ_0 deg C, S is the specific heat and W the specific gravity of the conductor in the required units, while a is the resistance temperature coefficient at the initial temperature. Taking for calculation purposes a basic temperature of 20 deg C, the formula becomes :—

$$\theta = [1 + a\ (\theta_0 - 20)]\left(\frac{e^{Yt} - 1}{a}\right) \quad \ldots \quad \ldots \quad (2)$$

Substituting for R_0 in terms of conductor area A sq in and applying the normal constants for copper, gives the short circuit current as :—

Introducing the temperature conditions according to present limits ($\theta_0 = 70$ deg C and $\theta = 50$ deg C) gives :

$$I\sqrt{t} = \text{A.57150 for copper (A.K.)} \quad (4)$$

In practice decrement of the current usually takes place during the period of short circuit owing to the effects of circuit reactance and fault resistance, which gives the calculated values an additional safety factor. Also, depending upon the

time element, some heat is absorbed by the cable dielectric and by free compound on the conductor surface or between the wire strands, tending to restrain the final temperature rise. The extent to which this occurs will vary with the type of cable and conditions of service, so it is inadvisable to take it into consideration when compiling data for general cable installations.

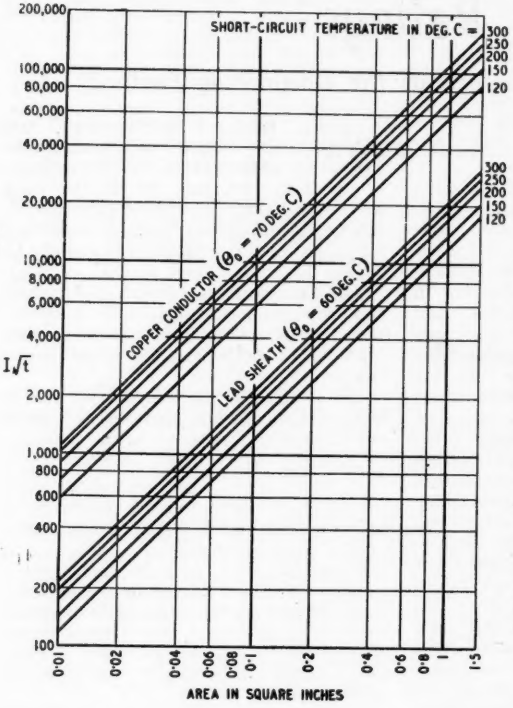


Fig. 1.—Short circuit cable ratings for higher temperatures

With the maximum conductor temperature fixed, the short circuit current for a given time will depend upon the initial cable temperature. There does not appear to be any reason why consideration should not be given to those cases in which the continuous rating temperature of the cable is specified to be less than the 70 deg C assumed for the standard conditions. Thus for those cables in which the conductor temperature is definitely limited to 65, 60, 55, or 50 deg C, as the case may be, the appropriate constant K can be ascertained from equation (3) by substituting the correct value of θ_0. This aspect also concerns those cases, as previously mentioned, in which larger cables than the load demands have to be installed to match the short circuit conditions, and are therefore operating at a comparatively low temperature. Provided that in these circumstances the particular circuit kVA remains fixed, meaning that the cable load will not be expanded later to deal with some future development, then it should be possible to employ the most economical size of conductor that will satisfy the short circuit requirements by taking into consideration the actual temperature which the cable will attain when carrying the given maximum load. In calculating the conductor section required it can be assumed approximately that temperature rise is inversely proportional to the square root of the copper area. Since the minimum size of cable to take the load is known and also the maximum size for the standard short circuit rating can be ascertained, the most suitable cable conductor will lie between these limits and have a constant K, corresponding to the correct initial temperature, equal to $\frac{I\sqrt{t}}{A}$ (see Table I).

TABLE 1.—Calculated Variation of K with Conductor Temperature.

Initial Copper Temp. θ_0 (deg C)	K for 120 deg C Short Circuit
70	57,150
60	63,120
50	68,750
40	74,120
30	79,320
20	84,380

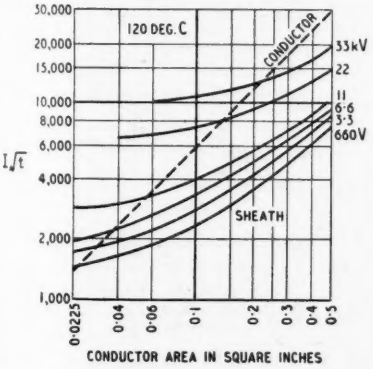
Operational experience, more especially during the war years, has tended to show in general that cables have a fairly high

factor of safety against damage by short circuit, so that consideration has been given to the possibility of raising the maximum conductor temperature. It must be borne in mind that when approaching 300 deg C there is danger of charring the paper insulation, even with the shortest time of break; also a risk of softening the solder in joints and melting the lead sheath with longer periods of fault duration. Therefore at higher temperatures it is possible that the limiting factor will be the current carrying capacity of the lead sheath and that earth faults will prove to be the dominating condition for short circuit ratings. Maximum short circuit currents will then vary with type of cable on account of the different diameters and lead thicknesses in relation to conductor size and voltage.

Substituting in the original formula the constants applicable to the lead sheath type, gives the short circuit current as follows :—

$$I = \frac{A^1 2.7 \times 10^4}{\sqrt{t}} \left[\log e \frac{1 + a^1(\theta + \theta_0 - 20)}{1 + a^1(\theta_0 - 20)} \right]^{\frac{1}{2}} \quad \ldots (5)$$

The sheath temperature at maximum load will be somewhat lower than that of the conductor and will vary with the type of cable and method of installation.



Taking a maximum initial lead temperature θ_0 of 60 as against 70 deg C for the copper and limiting the final temperature during short circuit to 120 deg C as before, then equation (5) simplifies to :—

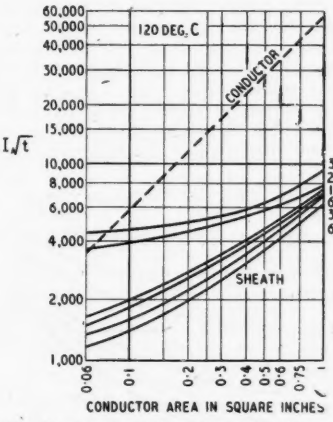
$$I\sqrt{t} = A^1 \, 11660 \text{ for lead } (A^1K^1) \quad \ldots (6)$$

K^1 for various sheath temperatures (Table 2) has been calculated in a similar manner to Table 1.

TABLE 2.—Variation of K^1 with Sheath Temperature.

Initial Lead Temp. θ_0 (deg C)	K^1 for 120 deg C short circuit
60	11,660
50	12,700
40	13,700
30	14,660
20	15,600

Faults to earth are the commonest in practice, but the variable earth return path makes it by no means easy to compute the actual short circuit kVA to earth of any particular supply system. There is the probability of a low resistance earth path in the case of buried cables and, when armouring is employed, a further parallel path for fault current exists. However, in practically all installations there will be certain sections of the cable run where the lead sheath



Figs. 2 and 4.—Lead sheath short circuit currents for three-core cables.

itself must carry the full short circuit current, so that in order to safeguard the system completely it is advisable to base such ratings on the capabilities of the sheath alone. Calculations made both for conductor and lead sheath indicate (Fig. 1) the effects of increasing the maximum short circuit temperature while Table 3 (given on the following page)

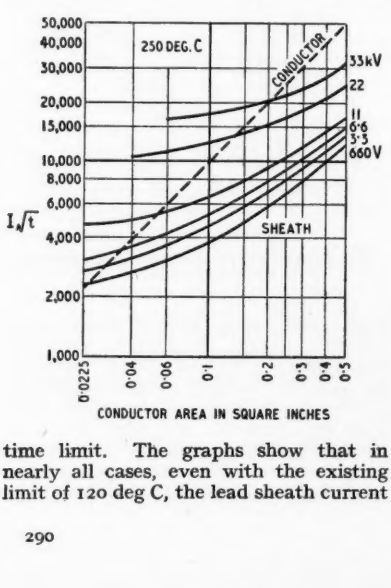
is a comparison of the two constants K and K^1 for copper and lead.

To determine to what extent the lead sheath will act as a limiting factor in the short circuit rating, it is necessary to associate a particular conductor with its relative area of lead sheath. For each conductor section there will then be a number of such ratings, depending upon

TABLE 3.—Variation of K and K^1 with Higher Temperatures.

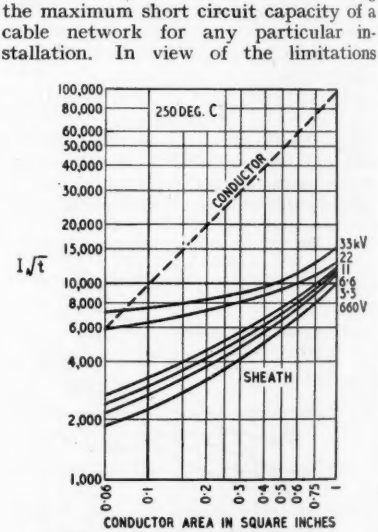
Max. Temp. (deg C) of Short Circuit	Value of K (Copper) Initial Temp. 70 deg C	Value of K^1 (Lead) Initial Temp. 60 deg C
120	57,150	11,660
150	70,830	13,980
200	87,390	16,880
250	99,890	19,690
300	109,940	20,880

the type of cable concerned. Comparative ratings for conductor and sheath have been calculated for maximum short circuit temperatures of 120 deg C (Figs. 2 and 4), and 250 deg C (Figs. 3 and 5) with $I\sqrt{t}$ plotted against cross-section of copper, so for a time period of one second the ordinates represent amperes of rating. Since the permissible short circuit current and the time period are so related that $I\sqrt{t} = I_1\sqrt{t_1}$, the rating for any other period can be obtained by dividing these values of $I\sqrt{t}$ by the square root of the new



time limit. The graphs show that in nearly all cases, even with the existing limit of 120 deg C, the lead sheath current is the deciding factor when the criterion of maximum temperatures is taken.

Already it is apparent that if the present conductor short circuit ratings are applicable to the cable sheath, the temperature of the lead will in many cases, particularly with respect to single-core cables, exceed the 120 deg C maximum specified. Any proposed increase of this rating consequent upon a higher temperature limit for the short circuit, although possibly not detrimental to the conductor, would prove dangerous if applied to the lead sheath. It is evident, therefore, that the maximum earth fault current, rather than the symmetrical phase fault current, will, in most cases, determine the cable short circuit rating. However, the respective magnitudes of both types of fault will need to be considered when assessing the maximum short circuit capacity of a cable network for any particular installation. In view of the limitations



Figs. 3 and 5.—Lead sheath short circuit currents for single-core cables.

set by the cable sheath, the highest permissible short circuit current must depend upon the maximum possible lead temperature; should this exceed 250 deg C there would be little margin of safety left and grave risk of damage in the event of any prolongation of fault current due to tardy or defective operation of the circuit relay. If it be

assumed that the present short circuit ratings can be applied also to earth faults, the resulting lead sheath temperatures (Table 4, calculated) of comparatively few types will be within the required limit of 120 deg C.

TABLE 4.—Maximum Lead Sheath Temperatures.

Conductor Area sq in	Conductor Rating (1 sec) amps	Lead Sheath Temp. deg C for 120 deg C Short Circuit					
		660 V	3.3 kV	6.6 kV	11 kV	22 kV	33 kV
Three-Core Cables							
.0225	1,290	110	93	85	71	—	—
.04	2,290	187	146	127	94	67	—
.06	3,430	312	243	152	127	74	66
.10	5,720	—	347	289	176	94	77
.15	8,570	—	—	410	312	130	96
.20	11,430	—	—	—	—	152	108
.25	14,280	—	—	—	—	199	132
.30	17,140	—	—	—	—	215	157
.40	22,870	—	—	—	—	288	195
.50	28,580	—	—	—	—	396	212
Single-Core Cables							
.0225	1,290	196	149	129	115	—	—
.04	2,290	498	318	263	220	86	—
.06	3,430	—	—	—	—	114	95
.10	5,720	—	—	—	—	198	156
.15	8,570	—	—	—	—	391	280
.20	11,430	—	—	—	—	—	—
.25	14,280	—	—	—	—	—	—
.30	17,140	—	—	—	—	—	—
.40	22,870	—	—	—	—	—	—
.50	28,580	—	—	—	—	—	—
.60	34,290	—	—	—	—	—	—
.75	42,870	—	—	—	—	—	—
1.00	57,150	—	—	—	—	—	—

It is of interest to note the sheath ratings for a range of normal cables corresponding to the higher short circuit temperature of 250 deg (Table 5) and to compare them with the existing standard ratings for conductors. Owing to the tolerances allowed in lead thickness and diameter for cables, these figures can only be considered as reasonably approximate.

TABLE 5.—Short Circuit Ratings for Sheath Temp. 250 deg. C.

Area of Conductor sq in	Lead Sheath Currents (Amperes for 1 Second)					
	660 V	3.3 kV	6.6 kV	11 kV	22 kV	33 kV
Three-Core Cables						
.0225	2,270	2,770	3,170	4,650	—	—
.04	2,690	3,170	3,570	4,870	10,500	—
.06	3,050	3,470	4,620	5,340	11,160	16,170
.10	3,640	4,860	5,300	6,960	12,120	17,110
.15	4,900	5,490	6,810	7,670	13,060	17,800
.20	5,460	6,940	7,420	9,440	15,380	20,730
.25	7,000	7,960	9,060	10,090	16,160	21,420
.30	7,510	9,120	9,720	12,180	18,560	22,580
.40	9,820	11,690	12,300	13,550	21,250	26,200
.50	11,970	12,780	14,840	16,240	23,080	31,100
Single-Core Cables						
.0225	1,480	1,760	1,990	2,190	—	—
.04	1,890	2,020	2,230	2,440	5,520	—
.06	1,910	2,230	2,440	2,670	5,880	7,260
.10	2,270	2,600	3,220	3,570	6,490	7,560
.15	2,600	3,400	3,640	3,910	6,980	8,050
.20	3,400	3,740	3,990	4,240	7,440	8,450
.25	3,740	4,030	4,940	5,230	7,860	8,740
.30	4,030	4,980	5,270	5,570	8,260	8,990
.40	5,220	5,650	5,950	7,080	8,990	9,670
.50	5,760	7,020	7,350	7,660	9,540	10,290
.60	7,170	7,610	7,940	8,260	10,070	11,100
.75	7,880	9,420	9,790	10,150	10,740	12,600
1.00	10,210	11,300	11,680	12,080	12,620	15,400

It is of interest to note the sheath ratings for a range of normal cables corresponding to the higher short circuit temperature of 250 deg (Table 5) and to compare them with the existing standard ratings for conductors. Owing to the tolerances allowed in lead thickness and diameter for cables, these figures can only be considered as reasonably approximate.

The fact that little lead sheath trouble in general seems to have been experienced in the past from earth faults, rather tends to belie the calculated temperature results by admitting to a much greater factor of safety than is shown by the figures in Table 4.

No doubt, owing to a certain amount of heat dissipation from the lead sheath during the short circuit period, for which no allowance is made, the calculated temperature tends to err somewhat on the high side, but this effect can only be of relatively small account. In practice, however, smaller currents can result from actual earth fault resistance and from inherent circuit impedance, such as resistance or reactance introduced into the neutral. Any increase of short circuit rating must perforce prove detrimental to the lead sheaths unless due precautions are taken to limit the magnitude of the fault currents to earth.

Heavy Alloy

A HEAVY alloy having a specific gravity 50 per cent greater than lead is being made at the Wembley Research Laboratories of the General Electric Co., Ltd. This powder metallurgy product is being adopted by aircraft designers when it is necessary to provide considerable weight within small dimensions. It consists of 90 per cent tungsten alloyed with nickel and copper and is manufactured by sintering pressed compacts of the material at a temperature of about 1,450 deg. C.

A typical application is its use in a "G" restrictor device applied to the aileron control system of the British Brabazon I aircraft. Weights made of the alloy are enclosed in two boxes measuring about 6in square by 1¼in deep, attached to the end of a horizontal lever coupled to the aileron controls. Each box contains three pieces of heavy alloy 6in by 2in by 1in weighing 7.5 lb apiece, so that the total weight of alloy in the device is 45 lb. In level flight the system is held in equilibrium by a spring cam mechanism, but any movement of the controls which would produce positive "G" is counteracted by the inertia of the balance weights tending to move the control column forward. Such action must therefore be deliberate; and it is impossible for a pilot of normal strength to make inadvertent movements of the controls.

Clow Committee's Proposals

Load-Limiting Possibilities

CONSEQUENT upon Mr. Gaitskell's decision that the system of surcharge and rebate upon electricity supplied to domestic consumers will not be continued, Mr. R. S. Edwards, a member of the Clow Committee, has written to *The Times* on the subject of domestic load limitation. He points out that while industrialists are to be required to reduce their demands by as much as 20 per cent during certain winter hours there will be no brake upon domestic electricity consumption. He contends that the Clow Committee's surcharge-rebate proposals were not sufficiently publicized and in consequence consumers did not realize the effects until they received their accounts. Although it was true that even with full realization they might not have economized during peak hours it was hardly to be supposed that the peak itself would not have been reduced.

Mr. Edwards goes on to say that this was not the only proposal made by the Committee. Two other major recommendations were (a) that the practice of charging commercial consumers on the basis of metered maximum demand should be extended and (b) that in districts covered by central control systems a series of experiments should be made with water heater control, load limiters, time-of-day tariffs and differential tariffs for "firm" and "non-firm" supplies of electricity.

Mr. Edwards says that it is sometimes argued that if peak load control requires the fitting of instruments in every home it would be more sensible to use the resources to build more power stations. But it might not be necessary to do anything like this to make a useful contribution. The Clow Report stated that 10 per cent of the domestic consumers accounted for 45 per cent of the domestic consumption. If tariffs associated with instrument control could be worked out which would make it worth while for the larger consumers to save at peak hours something of long-term value would have been achieved.

Atomic Power Plant

THE nature and potentialities of atomic power are the subject of a statement issued by the United States information service. The author is Mr. H. A. Winne, vice-president in charge of engineering policy of the General Electric Co. of America. He was given control of an atomic project which that company undertook in 1946 for the U.S. Government.

The statement begins with a reference in simple language to the conversion of matter, or mass, into energy in explanation of the important difference between combustion and fission. In the former, some of the heat released must be used to keep the chain reaction going, whereas in the latter heat is not necessary to continuation of the process, it being more like a by-product.

There is, at present, no means of directly converting to electricity the energy released in an atomic pile, or nuclear reactor, but the accompanying heat could be extracted by pumping a liquid, or a gas, through the pile and then circulating the heated fluid through a kind of heat-exchanger, which would generate steam to drive a turbo-generator. Thus an atomic pile with some auxiliaries would merely replace a fuel-fired steam boiler and consequently it seems to Mr. Winne that the first cost of an atomic power plant would, at least, be as high as that of a fuel-fired plant under normal conditions.

As to operating cost, the author thinks "it is entirely possible, but far from certain," that at some future time the cost of nuclear fuel will be competitive with that of coal or oil. A reliable estimate is not yet possible. The cost of fuel, on the average, accounts for from 20 to 25 per cent of the price paid by the American consumer for fuel-generated power. An equivalent reduction of the cost of power to the consumer could be expected if nuclear fuel became available at little or no cost. That would be tremendously significant, but not in keeping with some prophecies.

There is the "very definite" possibility that atomic energy, because it is an extremely concentrated source, may offer economical electric power to areas where the transportation cost of ordinary fuels is extremely high. But atomic power plant, to be efficient and economical, will necessarily be of large capacity and may require supporting chemical plant to reclaim partly used fuel.

There are possibilities in atomic power. Mr. Winne thinks one or two small plants will be operating experimentally within three or four years, but the evolution of full-scale plant will need a long period of time.

Drawback of Customs Duties

Reducing the Cost of Exports

By JOHN C. HANCOCK

JOINING the chorus of Governmental spokesmen who have been urging exporters and manufacturers to reduce their costs in order to meet foreign competition comes the voice of Mr. Acheson, United States Secretary of State, who boldly asserts that British goods should be cheaper. This necessity has long been recognized by electrical exporters and manufacturers, but with controls and restrictions, nationalized fuel and high taxation—to mention but a few impediments—what real chance has the exporter of surmounting these severe obstacles to price reductions?

How the process of reducing our costs is to be carried out except by "increasing our productivity," to use a well-worn platitude, is not immediately apparent, but one money-saving expedient which might prove profitable to exporters and manufacturers alike is a study of the various drawback schemes now in operation but which, perhaps, are not as widely known as they should be. 'Drawback," to quote the Concise Oxford Dictionary, is the "Amount of excise or import duty paid back or remitted on goods exported."

Many exporters seem to think that drawback may be claimed only by the original importer or manufacturer of goods containing dutiable materials. This is not the case. When the exporter is neither the importer nor the manufacturer, drawback may be claimed by the exporter on submitting proof to the Customs that duty has been paid and also that the goods are eligible for drawback, as will be shown later in this article. Another point not always appreciated is that drawback may be claimed not only when certain goods are exported direct to an overseas customer, but also when they are shipped for use as ships' stores or when they are sent to a registered shipyard for use in the building and repairing of vessels. Under such conditions as these the exporter should be able to find one or two avenues of economy.

Customs drawbacks may be allowed on goods falling within these main headings: (1) Goods which are exported in the same state as imported. (2) Goods manufactured in the United Kingdom from imported materials on which duty has already been paid. (3) Miscellaneous goods.

The simplest example, though of purely academic interest to the electrical exporter, of articles coming under the first heading is that of eggs in shell. Several things can happen to eggs without a change of "state": for example, they can be sorted, graded, date-stamped and repacked, etc. By the same token, supposing that we change our example from eggs to a consignment of electric clocks, they could be re-exported without a change of state in much the same way as a consignment of eggs, but the process could be extended to cover, for instance, the fitting of a special chiming device. So long as the goods have not been used, and so long as the process (if any) to which they have been subjected has not changed their form or character, drawback under certain conditions would be payable. Also coming within this category are ebonite component parts of accumulators, which are eligible for drawback when exported or shipped as stores, or when sent to a registered shipbuilding yard. (For convenience, the word "exported" in quotation marks will be taken to mean all the foregoing definitions for the remainder of this article.)

Regarding goods under heading (2) an obvious example is that of linseed oil. This figures in the manufacture of insulating cloths and varnishes, oil baize, paints and enamels, all of which articles would be eligible for drawback on account of this dutiable ingredient.

Miscellaneous goods (heading (3)) comprise, for our purpose here, commodities ranging from hydocarbon oils to silk yarn. Transformer oil answers to the description of a hydrocarbon oil, and drawback may be claimed on duty-paid

oil not only when it is "exported" with the transformer, but also when it is "exported" in separate drums or containers. The silk yarn, made up perhaps into lampshades, or the braiding on a length of silk-covered flex would also come within the scope of drawback arrangements.

Making a Claim

The exporter should first of all satisfy himself, before submitting a claim for drawback, that he is in a position to afford proof that the goods are eligible for drawback.

The Commissioners of Customs and Excise are empowered to inspect account books and other documents to determine whether duty has been paid on the goods or materials on which drawback is being claimed. Evidence, in the form of an officially certified copy invoice—or extract therefrom—detailing the port of importation, number and date of entry, etc., should be produced when submitting the claim. When the exporter is not the importer, a statement giving these details should be obtained from the importer and submitted when lodging a claim.

Slight variations in procedure are required for different classes of goods, but the general principle is the same, and the exporter will readily find out for himself the correct method to adopt.

Before claims for drawback are allowed, it is necessary to enter into a bond with H.M. Customs and Excise for the due exportation of the goods. The bond may be a "general" bond to cover a series of shipments, or an "ordinary" bond to cover a single shipment only. Naturally it is to the exporter's advantage to take out a "general" bond to avoid repeated action.

The granting of a Board of Trade export licence to the trader does not in any way constitute a claim for drawback. On the other hand, the exporter is not bound to make a claim for drawback when he exports dutiable goods. In fact, it is very often not economical to enter claims for small amounts as there are various charges, such as "presenting to H.M. Customs." raised at the docks which can, and sometimes do, amount to more than the value of the claim.

Not surprisingly, all claims for drawback have to be made on an approved form, and the exporter's experience in form-filling should, therefore, stand him in good stead! The forms, which can be obtained from H.M. Stationery Office or from any stationer who deals in shipping and other commercial documents, are all clearly headed, so the exporter should have no difficulty in deciding which one is appropriate.

Although they differ slightly in detail, the general layout of the forms is the same. Mostly they consist of "original" and "duplicate" portions. The original bill is forwarded with the goods to the docks, and the duplicate, which embodies a "Notice to Pack," has to reach the local officer of Customs and Excise at least 24 hours before packing is due to commence to enable him to inspect the goods before "exportation."

Goods may be inspected either at the exporter's own premises—in which case proper accommodation and weighing and sampling facilities must be provided—or they may be examined at the ship's side. in which event each package must be labelled To be produced to the Officer of Customs and Excise before shipment." If the officer does not attend at the trader's premises at the time stated in the "Notice to Pack," the goods may be sent to the port of shipment and the "original" bill forwarded to the Customs officer at the docks in time to reach him before the goods are received on board.

Marking Packages

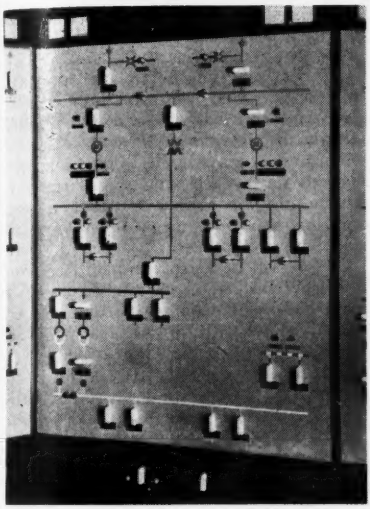
Each package forming the consignment should bear a green "Exported on Drawback" label, as packages have to be identified by the master, mate or authorized person of the carrying steamer, who certifies on the "original" that the goods have been duly taken on board.

Although the procedure for claiming drawback may appear to be somewhat complicated and perhaps "not worth the trouble," it becomes purely a matter of routine after the first few claims.

The exporter cannot be expected to know every regulation governing all the various commodities on which drawback is allowed. He would be well advised, therefore, to arm himself with a copy of the Customs and Excise Tariff—which gives full details regarding the rates of duties and drawbacks—and to obtain copies of the public notices which are issued by the Customs and Excise.

Remote Supervisory Control

EQUIPMENT ON LONDON UNDERGROUND RAILWAYS



Power circuit diagram and illuminated-handle switches on a typical panel

WORKING in conjunction with the technical staff of the London Transport Executive, engineers of the General Electric Co., Ltd., have designed and installed the remote supervisory control system for the power supply to the Central Line extension of the Underground from Liverpool Street to Loughton and the Hainault loop.

The area over which the system operates contains eleven transforming, rectifying and distributing substations. The switchgear at all eleven substations is arranged to be controlled from South Woodford substation. Control of switchgear at substations other than South Woodford is effected remotely over pilot cables, while that at South Woodford is controlled directly over multi-core cables connected between a control cubicle and the substation switchgear.

Control cubicles at South Woodford substation, showing the front panels and switches

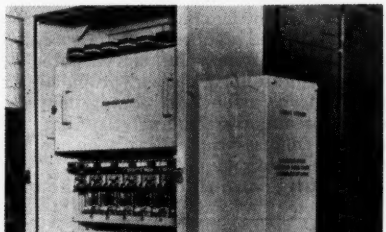
The supervisory control apparatus associated with each substation consists of a cubicle in the control room at South Woodford, and a supervisory unit located at the substation. The eleven cubicles, with an additional cubicle provided for future development, are arranged in the shape of an open rectangle so that the control engineer can see at a glance the conditions throughout the system.

A control panel is fitted in the front of each cubicle, and is laid out in the form of a mimic diagram of the power network at the substation concerned. Keys of the illuminated-handle type are used for the control of switchgear and they provide both control and indication facilities. One key of this type both selects and operates the remote switchgear, whereas in some earlier systems separate keys have been required for the two functions. Indication that both operations have been effected is given by the handle lamps in the new keys instead of by two separate indicator lamps. By simplifying the procedure needed for restoring a circuit

breaker, a considerable cumulative gain in time is achieved when a number of breakers are involved after a power failure.

The supervisory control system provides a total of twenty facilities, including indication of faults and power failures. In addition to the control and indication of circuit breakers for the traction supply, the lighting, signalling, escalator, and air-compressor supplies are similarly controlled from South Woodford.

Apart from the South Woodford control panel, which is connected to the local



Supervisory unit at Bethnal Green substation

switchgear by multi-core cables, each substation control cubicle is joined to the supervisory unit at the respective substation by two pairs of pilot wires. Under normal working conditions, both pairs are used for signalling. One pair carries signals for a select and operate sequence, while the other returns signals for alarm cycles.

In the event of one pair being open-circuited by a fault, supervisory control and indication can immediately be arranged to work over the good pair. Under these emergency conditions there is no diminution in the facilities available, the only effect being to increase the time required to complete a series of operations, since signalling over a single pair of wires can proceed in one direction at a time only. The control station circuits are normally ready to receive a signal (an alarm cycle) from the substation. A select and operate cycle takes precedence over an alarm cycle, and any alarm cycles which may be initiated during a select and operate sequence are held up until the sequence has been completed.

Pulses of d.c. are transmitted from South Woodford in certain sequences to form codes for ensuring correct selection and operation of the switchgear. The control key of the circuit breaker to be operated is thrown to and held in one of the two non-locking positions of the key springsets. The lamp in the key handle is flashed and when the circuit breaker at the substation has operated, the light in the control-key handle glows steadily. The control key is then released and restored to a locking "indicate" position and the key handle is extinguished. The total time taken for the operation, from the initial turning of the control key until the key handle glows steadily, does not exceed two seconds.

The operation of a circuit breaker by local control initiates an alarm cycle, and is indicated at the control station by the ringing of a bell and the lighting of a cubicle nameplate. The control-key handle of the changed breaker flashes so that it may be quickly identified. The bell is silenced and the nameplate lamps extinguished when a common "Silence Bell" button is pressed. The breaker-key handle continues to flash until the key is turned to agree with the new indication.

On tunnel sections, two bare telephone wires are run along the side of the tunnel. In an emergency they may be clipped together to trip the two feeder breakers supplying the track. Visible and audible alarms are given at the control station if the wires are clipped, and the lamp lights to indicate the "tunnel trip" conditions. Each section of track is fed through two circuit breakers, and the possibility exists that one of the breakers may fail to trip when "tunnel trip" con-

ditions are imposed. To give warning of this eventuality a red "track alive" lamp glows. The closed breaker can then be tripped by supervisory control.

When tunnel-trip arrangements are in force, the "close operate" function of the affected track-feeder breaker keys is rendered ineffective. Should the "tunnel trip" be caused by a fault, power may be restored at the discretion of a responsible official. A key is inserted into a lock switch fitted on the control panel and when it is turned, the "close operate" function of the associated breaker key is rendered effective. The track-feeder breaker may then be closed by supervisory control in the normal manner. If the key is removed from the lock before the emergency has ended, tunnel-trip conditions are imposed again in full.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Telephone Line Protection

IN answer to Mr. J. F. Perrin's letter, I should explain that the value of 2,000 ohms used to simulate the resistance of a man's body was chosen after consideration of available data, which admittedly is not conclusive. The *Electrical Review* of 13th October, 1944, quoting from *Electronics* of July, 1944, gives the value of 1,000 ohms as a low body resistance. In *Electrical Engineering* of August, 1947, Charles F. Dalziel comments that skin and body resistances decrease with both time and current. He considers that high-voltage shocks cause burns which break down the comparatively high resistance of the skin, and the resistance of the body then falls to 500 ohms or less.

In view of the danger and difficulty of making body resistance measurements under the above conditions, and because the conductor dropping tests required only an approximate value, no measurements of human body resistance were made specially for the purpose of this experiment.

P. B. FROST,
for Engineer-in-Chief, G.P.O.

London, E.C.1.

Disposal of Fluorescent Tubes

YOUR correspondent, Mr. Chas. W. Waddington, has evidently not read the "Industrial Accident Prevention Bulletin" for January, 1949, which explains that these tubes should be broken up under water to prevent the inhalation of the beryllium compound.

A drum of water containing a fine mesh wire bucket should be set aside solely for this purpose. The vacuum of the lamp is broken by a sharp tap on the cap; the glass tube can then be broken up under water and the whole should be buried on waste ground.

Under no circumstances should these tubes be placed out for dustmen, or salvage collectors, to take away as they may not be familiar with the correct procedure for disposal.

Barrow-in-Furness. D. P. CHAPMAN.

Portable Tools

I WAS interested in the article on this subject in your issue of 29th July and fully endorse the author's condemnation of the use of portable tools at 200/250 V. In recent years I have always advocated the installation of local transformers stepping down to 110 V with the centre point of the secondary earthed. There are two points which I consider should be emphasized:—

(a) The inclusion of a circuit breaker to control the transformer is justified when earth leakage protection is adopted due to the severity of local conditions. In other cases the transformer will probably be energized from a local distribution board. The rating of the fuses concerned should, however, be kept as low as possible to ensure that the earth current due to a fault in the tool will blow them. The higher the resistance of the fault the less likely are the fuses to blow.

(b) In most works a system of three-pin socket-outlets will be built up for the use of portable tools at 110 V. They must be of some pattern and not interchangeable with those at any other volt-

age; if the sockets are switched, they should invariably have *double pole* switches.

Incidentally, I like portable hand lamps to be used at 110 V from the same system of special socket-outlets.

B. C. ROBINSON, Assoc.I.E.E.

Pontypool.

[Part of one of the circuit diagrams in the original article (Fig. 4) was incorrectly drawn. The small transformer A should be connected on the live mains side of the contactor, otherwise the latter could not be closed because voltage would not be available to energize the coil B. Also there should be a connection from the centre of the secondary winding of transformer G to earth, if the fuses are to blow in the event of a motor fault to earth.—The Editors.]

Radio Interference

THE recently published British Standard Code of Practice, CP.321.101, for electric wiring systems emphasizes the point that, in order to reduce or eliminate mains-borne radio interference, wiring installations must be metal-clad. I find considerable diversity of opinion on this point, however, amongst installation engineers, some of whom even hold the opposite view that a metal-clad installation can, in some circumstances, increase radio interference.

Others state that metal-cladding the wiring installation is of benefit only in connection with battery-operated radio receivers and has little, if any, effect upon mains-driven receivers. I do know that in the case of a flat in which I lived recently, in which the installation was as metal-clad as it was possible to make it, every operation of a switch and every movement of the water-heater or iron thermostat was faithfully reproduced by my receiver. On the other hand, the installation in my present flat is plain junk, but the interference is considerably reduced and is negligible.

It is pointed out to me that out-of-balance currents can be measured by tong-type ammeters even when the wiring is enclosed in conduit, or even gas piping, and that some radio interference effects can actually be transmitted by the metal sheathing of conductors. One research engineer tells me that interference can be eliminated only if every flexible cord is metal-clad as well as the main wiring installation.

Are there other experiences available on either side, as the matter would appear to be of some importance with the proposed extension of television services?

T. C. GILBERT, M.I.E.E.

Folkestone.

A Rural Extension

ON July 26th at 4.30 p.m. I was at a farm where milking had started. Off went the electricity so that hand milking had to be resorted to in the sweltering heat. When I got home the supply was still off. I was informed men were working on the wires a mile down the road and went to see what had happened (besides, I wanted a cup or tea without having to hunt up means of boiling water).

All that appeared to be going on was a service line of six poles to two private houses. There were six men on the job but no engineer in charge. The inconvenience over a few square miles must have been serious for the supply was off until 9.30 p.m. The wires were l.v. and I cannot see why the supply was off at all.

The two service wires were stranded copper, about 0.5 sq in; a single strand one-tenth the area would have been ample. The field across which the service passed was strewn with 4ft long 11in dia. butt ends sawn off the poles that still seemed too long and very heavy.

Is this happening all over the country? It is enough to make the pioneers turn in their graves.

W. A. TURNBULL, M.I.E.E., M.INST.C.E., WH.EX.
(Late Borough Electrical Engineer, Aylesbury).

Aylesbury.

Supply in Melbourne

FOR the seventh consecutive year conditions of restricted supply prevailed in Melbourne during 1947-48. The maximum demand was 73,500 kW which Mr. B. Woodfull, the city electrical engineer, in his annual report estimates to be 6,000 kW lower than would have occurred without restrictions. Total sales for the year ended 30th September last amounted to 198.8 million kWh compared with 188.1 million in the previous year.

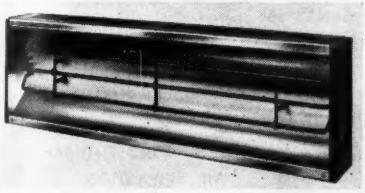
RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

Infra-Red Element Projector Units

AN addition to industrial infra-red equipments made by the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester, 17, is a range of projector units fitted with tubular sheathed type heating elements.

They are 11 9/16in wide in standard lengths



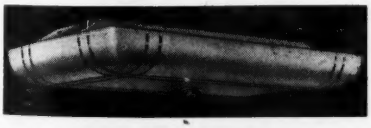
Metrovick infra-red element projector unit

of 36in, 24in and 18in, and each one incorporates three elements, thus allowing projector loadings of from 2 kW to 4 kW. They are available for d.c., single-phase and three-phase a.c. operation. Projectors with higher or lower intensities of radiation and with more or fewer elements than the standard assembly can be supplied.

These projectors can be used singly or mounted end to end to form continuous troughing; butted side by side to form a bank; or contoured suitably and mounted in a framework to form a complete oven. High concentrations of infra-red can therefore be obtained in a relatively small area.

Fluorescent Lighting Fittings

An attractive range of fluorescent lighting fittings made by N.V. ELECTRICAL & MUSICAL INSTRUMENTS, LTD., 4, Lancaster Street, Birmingham, 4, incorporates the "Everstart" device which is claimed to ensure instantaneous starting even with a volt-

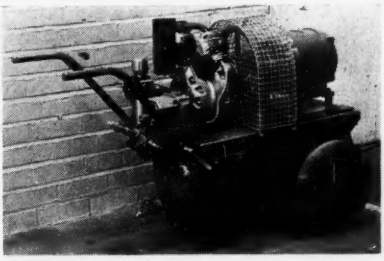


N.V. fitting accommodating four 20 W fluorescent tubes

age variation of as much as 25 per cent. Of particular interest are a unit specially designed for shop window lighting, a new fitting accommodating six 18in tubes arranged vertically, totally-enclosed "Perspex" ceiling fittings housing four 5ft tubes for use in restaurants, etc., a portable garage unit holding 40 W tubes and a similar fitting with two 20 W tubes for use in bathrooms. In addition, a full range of low-voltage machine transformers and solenoids is available. All components, chokes, etc., are manufactured by the associated company, the Midland Coil Winding Co., Ltd., and special care is taken to ensure that the chokes are noiseless.

Mobile Compressor Unit

A mobile compressor set with a working pressure of 100 lb per sq in and a displacement of 13.6 cu ft per minute is now being manufactured by the HYMATIC ENGINEERING CO., Redditch, Worcs. It is fitted with either an electric motor or petrol engine and is 55in long, 23in wide and 37.5in high. Careful weight distribution with conveniently set handles and rubber-tyred



Hymatic electrically driven mobile compressor

wheels provide the maximum mobility with the minimum effort. This compressor, apart from its own general purpose uses, is also being sold in complete "ready-to-use" outfits including liquid spraying and spray painting equipment.

Cooker Controls and Switch Sockets

Two new 30 A a.c. cooker control units and a range of a.c. switch sockets are announced by M.K. ELECTRIC, LTD., Wakefield Street, Edmonton, London, N.18. One of the cooker control units (No. 5080) incorporates a 13A rectangular pin socket outlet and fused plug, while the other (No. 5100) has a 15A round pin socket outlet and fingershield plug protected by a 13A cartridge fuse housed in the base of the unit.

In both cases the main and auxiliary switches are of the latest a.c. double-pole design, and M.K. patent spring grip sockets and anti-flash screens are fitted. Five knockouts and ample earthing facilities are provided. There are bold ON/OFF indications and the whole interior is removable as one unit. The bonderized steel case and lid are finished in durable cream enamel. The dimensions are only 6in high by 5½in wide by 2¼in deep.

M.K. No.5080 cooker control unit and (right) switch socket

The switch sockets, which are made in 5 and 15 A, 3 pin surface and sunk, single and double pole types, embody a firm but smooth silently-operated snap action. The pure silver contacts are virtually everlasting. In these units too the patent spring grip socket and anti-flash screens are incorporated.

Proximity Switching Unit

A device for switching on shop window lighting or displays when the hand is brought into contact with the window at a suitably indicated point is being made by BRITISH ELECTRONIC PRODUCTS (1948), LTD., Rugeley, Staffs. There are two two models rated at 5 A 230 V a.c. and when the window is touched one of them switches the lights on for about 30 seconds. With the other unit the lights remain on only so long as the hand is in contact with the window.

The unit is housed in a sheet steel case 4¾in by 3⅞in by 11½in finished in dark grey wrinkled stove enamel, having a conduit entry in the base and a terminal for the control circuit, access to the interior being obtained by removal of the front cover. Lugs are provided for wall mounting, or the unit can be placed on the floor if desired.

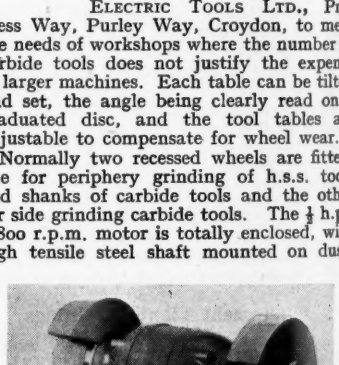
Isolators and Switchgear

A range of isolators and switchgear for use in a.c. circuits, offered under the proprietary name of "Coolex" by FALK, STADELMANN & Co., LTD., 91, Farringdon Road, London, E.C.1, dispenses with the more usual knife switch arrangement and incorporates separately spring-controlled heavy copper wiping brushes of segment form. A further spring control ensures that the arc on breaking (if any) occurs at a point remote from where current is carried. The base contacts are large enough to dissipate any heat which may be generated, while all of the metal operating parts are cadmium plated. Ceramic interpole flash barriers hold the base contacts, and the switchfuse gear has standard rewireable fuse carriers. The cases are made from sheet metal to have rolled edges and a strengthened base. The gear is available as double-pole, single-pole and neutral, triple-pole, and triple-pole and neutral at ratings of from 15 A to 60 A at 500 V.

Tool Grinder

An 8in carbide and h.s.s. tool grinder type BGS-8 has been designed by GRIMSTON ELECTRIC TOOLS LTD., Progress Way, Purley Way, Croydon, to meet the needs of workshops where the number of carbide tools does not justify the expense of larger machines. Each table can be tilted and set, the angle being clearly read on a graduated disc, and the tool tables are adjustable to compensate for wheel wear.

Normally two recessed wheels are fitted, one for periphery grinding of h.s.s. tools and shanks of carbide tools and the other for side grinding carbide tools. The ½ h.p., 2,800 r.p.m. motor is totally enclosed, with high tensile steel shaft mounted on dust-sealed, grease-packed ball bearings. Arranged for bench mounting the price is £28 for three-phase, £29 for single-phase and £32 for d.c. A floor pedestal costs £7.



Grimston 8in tool grinder

COMMERCE and INDUSTRY

Scottish Contractors' Country Allowance : Canadian Aluminium Scheme

THE Central Board of the Electrical Contractors' Association of Scotland announces increases in "country allowances" as from 5th September. The allowance for four days or less is raised from 5s 6d to 6s a day; the weekly rate from 31s 6d to 35s; and payment for additional days over one week from 4s 6d to 5s per day.

The additional country allowances to first and second year apprentices of 1s per day and 4d per day respectively, will continue. There is no alteration in the existing country jobbing rate of 5s 5d per hour.

"Electrical Who's Who"

As we are now about to go to press with our "Electrical Who's Who" we appeal to those who have been sent questionnaire forms and have not returned them to do so immediately.

B.E.A. as Manufacturers

A special "British Electrical Equipment" section was recently published by the *Financial Times*. One of the articles in this touched upon the manufacturing powers possessed by the British Electricity Authority and referred to the fact that although the Authority was expressly prohibited by the 1947 Electricity Act from embarking upon export trade a wholly-owned subsidiary, Tricity Cookers, Ltd., was actually exporting its products.

"It is stated officially that the management of this concern is entirely independent and that furthermore it would not be able to obtain its allocation of steel unless it engaged in the export trade. But that is no comfort to private manufacturers of the same type of goods as Tricity Cookers who are faced with the competition from a concern which, in one way or another, has the backing of public funds."

The article concludes: "The importance of continuing good relations between the B.E.A. and the private enterprise firms which serve it can scarcely be overrated. It would be disastrous if these were jeopardized by any tendency on the part of the Authority to enter into trading activities from which it has been specifically excluded by Act of Parliament."

Lead Price Raised Again

Following upon a further increase in the American price of lead, the Ministry of Supply announced this week that there would be an immediate rise of £2 2s 6d in the price of good soft pig lead to £87 5s a ton.

Vertical Fluorescent Lighting

Specially designed seven- and eight-lamp vertical fluorescent fittings form the motif of two lighting schemes recently carried out in the New Street and Bennet's Hill branches of the Midland Bank in Birmingham. Both installations were planned by the Illuminating Engineering Dept. of the General Electric Co., Ltd., under the supervision of the architects, Whinney, Son and Austen Hall, of London.

In planning a fluorescent scheme to replace the old tungsten lighting a choice had to be made between the higher efficiency of horizontal fittings and the greater architectural harmony that could be attained with less efficient vertical fittings. After tests had been carried out with three types of fitting a vertical multiple-lamp design was decided upon in which the gear is housed in a central column encircled by the lamps in reeded "Perspex" covers. The metalwork is finished in real bronze colour.

The installation at the New Street

Vertical fluorescent fittings at the New Street, Birmingham, Branch of the Midland Bank

Branch, for which Harold F. Ward, Ltd., of Birmingham, were the contractors, consists of thirteen eight-lamp vertical pendant fittings, and eight three-lamp wall fittings to match, "Osram" 5ft 80 W "warm white" lamps being used throughout. In the installation at the Bennet's Hill Branch ten pendant fittings similar to those at New Street but holding only seven lamps each are used. Walker Bros. of Birmingham were the contractors.

Electricity in Horticulture

One of the attractions at the recent National Gardens Show held at Olympia was the stand of Rural Electrification Services, Ltd., on which were shown electric soil sterilizers, electric pasteurizing units and greenhouse heating units.

Works Visit

About a year ago a civic party from Preston, together with representatives of various organizations in the town, visited Almelo, Holland. This visit has been reciprocated by a visit made recently to Preston by the Burgomaster of Almelo, Dr. J. M. Ravesloot and his wife, Mrs. Ravesloot, Mr. J. G. Duchemin, and other representatives from Almelo. Included in the itinerary while guests of Preston Corporation was a visit to the Siemens lamp factories at Dock Road and Fylde Road. The visitors were received by Mr. P. D. Oakley, works manager, and were conducted round the research laboratories and factories by Mr. Oakley and Dr. J. N. Aldington. They were shown research and development proceeding on various types of tungsten filament and electric discharge lamps, and given a glimpse of a number of lamp-making processes in the Dock Road works. They were then conducted to the new Siemens fluorescent lamp factory in Fylde Road, where they inspected the fluorescent powder production laboratories and the automatic equipment producing fluorescent lamps of various standard sizes and colours.

Dutch visitors to Siemens' Works

Left to right: Dr. J. N. Aldington (director of research, Siemens' Preston laboratories), Mr. J. G. Duchemin, Mrs. J. M. Ravesloot, Mrs. J. Jamieson (Mayoress of Preston), Alderman J. Jamieson (Mayor of Preston), Dr. J. M. Ravesloot (Burgomaster of Almelo, Holland), Mrs. W. E. E. Lockley, Mr. W. E. E. Lockley (town clerk, Preston), Mr. P. D. Oakley (works manager, Siemens' Preston lamp factories).

Trade with Germany

The Commercial Relations and Exports Department of the Board of Trade has a report (MAR/270) dated 21st July which sets out the current procedure for imports into Western Germany and supersedes reports MAR/59 and MAR/59A-B.

American Forces' Purchases

The Commissioners of Customs & Excise point out that when the United States Forces in this country buy consumer goods for resale to their personnel stationed here, or for the equipment of premises, these sales are regarded as "exports" for other purposes but they cannot be so regarded for purchase tax and registered traders must therefore charge tax in the usual way. But in order that the tax may not be detrimental to the placing of orders in this country arrangements have been made for re-imbursement to the U.S. authorities of any tax on goods which they obtain direct from registered purchase tax traders. For this purpose it is essential that invoices made out in connection with these purchases should indicate clearly the supplier's purchase tax registration number and the amount of tax charged. They must also bear a certificate by the registered supplier that he is directly responsible to H.M. Customs and Excise for payment of this amount of tax.

Mural Paintings for Electricity Showrooms

The interior of the headquarters of the South Western Electricity Board at Electricity House, Colston Avenue, Bristol, has not yet been completed and, in consequence, there are two window spaces at the front end of the building which are at present

bricked in. To relieve the drabness of these window spaces the Board has decided to have the exterior brickwork covered by appropriate mural paintings. The Principal of the West of England College of Art agreed to some of his students preparing the designs and carrying out the work during the summer vacation, and four students, David Bethel, Bernard R. Sharpe, Margaret George and Jean Burcombe, will execute the mural paintings, work on which was commenced this week.

The two designs consist of two maps of the South Western Area, one reflecting the principal activities of the Area and also showing the Electricity Board's Sub-Area administrative boundaries, and the other one showing the main electricity supply lines (the grid and the Electricity Board's primary network). The maps form part of a comprehensive design appropriate to the traditions of Bristol and the South West.

Test Apparatus Catalogue

A comprehensive 204-page catalogue of testing and measuring apparatus for communication engineering has just been issued by H. W. Sullivan, Ltd., London, S.E.15. It is primarily concerned with electrical standards of frequency, inductance, capacitance and resistance and with wavemeters, bridges and other measuring equipment of which such standards are essentially part. The first section of the catalogue comprises a reprint of an article "Standards and Standardization" by the company's chief engineer, W. H. F. Griffiths, F.Inst.P., M.I.E.E., which was originally published by the *Wireless Engineer*. It deals with the various factors which govern the accuracy of standards and is likely to be of great help to those wishing to choose a standard to suit some particular requirement.

Heating and Ventilating Engineers

The Institution of Heating and Ventilating Engineers has published a revised syllabus and rules for examinations for admission to membership of the Institution, to come into operation on 1st January, 1951.

Canadian Aluminium Project

The United Kingdom Trade Commissioner at Vancouver has reported that the Aluminium Co. of Canada has carried out preliminary investigations into the possibility of establishing an aluminium plant in British Columbia similar to the one at Arvida, P.Q., and which will incorporate a town site for 7,000 workers and a hydro-electric plant of about 1,000,000 h.p. Plans have now been announced to carry out a thorough survey of the proposed town site and dam site.

The object of this survey, which will start as soon as possible, is to check the footing for the proposed dam at the head of the Nechako river, locate and plan the best site for the town and lay-out of the deep water wharves. The 50-mile power line from the generating station to the town site will also be surveyed. The estimated cost is $300 million for the first stage, but the final cost may be in the neighbourhood of $500 million and may include a small iron and steel plant.

Power Convention Invitation

The Harrogate Corporation has invited the organizers to hold next year's British Electrical Power Convention in the town.

Halifax Industries Exhibition

A "Halifax for Britain" Exhibition was held recently at which the principal manufacturers in Halifax and surrounding dis-

The stand of Siemens Electric Lamps & Supplies, Ltd., and Alfred Graham & Co., Ltd., at the Halifax Industries Exhibition

trict took part. In the accompanying picture we show the display arranged jointly by Siemens Electric Lamps & Supplies, Ltd., and its associate company, Alfred Graham & Co., Ltd.

Fatal Shock in Mill Stream

An unusual electrical accident was described at an inquest recently at Windsor. It was stated that the victim, a 12-year-old girl, went to the rescue of her dog, which was hunting rats in the shallow water of a

mill stream at Clewer. Her leg came in contact with a water-pipe to which the electrical system of her home was earthed, and because of a faulty switch, combined with the exceptionally dry weather, the pipe was "alive," so that she received a fatal shock. Artificial respiration was started immediately, but there was no sign of recovery. The coroner, recording a verdict of "Death by misadventure," said that the circumstances emphasized the necessity for careful attention to electrical systems, but the conditions were unusual and unlikely to be repeated.

Killed by Radio Set Wire

While in the garden of his house at Upminster, Rees Edward Murray (38), a tugboat captain, received a fatal shock when he touched a wire attached to his radio set. At the inquest at Romford it was stated that his shoes were wet and he was standing on wet concrete. Artificial respiration was applied in the ambulance, but he was found to be dead on arrival at hospital.

Trade Announcements

M. C. L. & Repetition, Ltd., will in future be associated with the **Midland Bright Drawn Steel & Engineering Co., Ltd.,** Richmond Works, Brickhouse Lane, West Bromwich, which has acquired the business. The business will continue to be carried on by the present staff.

The Cambridge depot of the **British Thomson-Houston Co., Ltd.,** is now at Fellowship House, 133, Fitzroy Street, Cambridge (Telephone: Cambridge 54370).

The office of the **Metropolitan-Vickers Electrical Co., Ltd.,** at Stoke-on-Trent (sub-office to Birmingham), is now at Stoke Road, Stoke-on-Trent. The telephone number is unchanged. The Erection and Traction Erection Departments of the company's Birmingham office have removed to 26-28, Holloway Head, Birmingham, 1, where the company's Lamp Sales Office is still situated (Telephone: Midland 3842).

The Public Service Vehicle Department and the Battery Electric Vehicle Department which have hitherto comprised the business of **Northern Coachbuilders, Ltd.,** have separated. The Battery Electric Department has been transferred to **Smith's Electric Vehicles, Ltd.,** of which the directors will be Mr. D. Smith, senior, Mr. D. Smith, junior, and Mr. H. W. Heyman. The latter will continue to manage the business and will hold the office of managing director. The Public Service Vehicle Department will be operated by Northern Coachbuilders, Ltd., as hitherto, and there will be no change in the ownership of the group as a whole. This division of interest coincides with a move by Smith's Electric Vehicles, Ltd., into larger premises at Princesway, Team Valley, Gateshead.

Enfield Industries

The Enfield & District Manufacturers' Association, Ltd., has published "Industries of Enfield" (pp. 160, price 5s 6d, post free) describing the progress of Enfield as an industrial centre, and including a directory of ninety manufacturers and an index of products. The book is well produced on art paper and profusely illustrated. Copies can be obtained from the secretary of the Association, Enfield, Middx.

T.U.C. Conference

Among the matters upon the agenda for the Bridlington meeting of the Trades Union Congress in September are further nationalization proposals. Resolutions are being moved on behalf of the unions concerned for the taking over of the rubber manufacturing industry and the main sections of engineering and founding (Amalgamated Union of Foundry Workers).

The composition of the boards of nationalized industries is also to be discussed again. It will be urged that extensive training systems should be instituted to give workers the chance of fitting themselves for the duties and responsibilities of management.

Wilson Electric Vehicles

Under a wartime arrangement the assembly of electric vehicles made by Partridge Wilson & Co., Ltd., was undertaken in Manchester by Hindle, Smart & Co., Ltd., who became sole sales concessionaires for the United Kingdom. Partridge Wilson state that they now have space available at their No. 1 Plant Leicester and are resuming the assembly of the vehicles there.

Business Visits to Canada

A complaint has been received from the United Kingdom Trade Commissioner Service in Canada that in many instances United Kingdom business men visiting Canada do not allow sufficient time in each centre for making the necessary contacts and studying the market. This applies particularly to the towns in the Prairie Provinces and the West. The business community in Canada readily co-operates by giving up time at short notice to receive overseas visitors, and a bad impression is often created by United Kingdom executives who pay hasty flying visits.

The Board of Trade impresses upon United Kingdom business men the great importance of planning their visits so as to

allow sufficient time at each centre. The Commercial Relations and Export Dept., Thames House North, Millbank, S.W.1, will be glad to offer advice to firms and, if necessary, to seek the help of the Trade Commissioners in the drawing up of suitable itineraries.

Change of Name

The B.E.T. Electricity Supply Co., Ltd., has changed its name to B.E.T. Investments, Ltd.

On 1st August S. Wolf & Co., Ltd., changed their title to Wolf Electric Tools, Ltd.

Rediffusion, Ltd., has changed its name to Redifon, Ltd.

Catalogues and Lists

Dewhurst & Partner, Ltd., Inverness Works, Hounslow.—Leaflet 15D relating to the type SWS geared limit switch with micro-setting for control circuits.

W. T. Henley's Telegraph Works Co., Ltd., 51-53, Hatton Garden, London, E.C.1.—Catalogue of cables and accessories for the Henley wiring systems.

Fielden (Electronics), Ltd., Holt Town Works, Manchester, 10.—Technical folder describing the P.M.1 proximity meter.

Measuring Instruments (Pullin), Ltd., Electrin Works, Winchester Street, Acton, London, W.3.—Priced technical folder illustrating a range of frequency meters.

Mullard Electronic Products, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.—Catalogue of electrical, radio and television components.

Venner Time Switches, Ltd., Kingston By-Pass Road, New Malden, Surrey.—Priced leaflet of time switches for shop window lighting and sign control installations.

Wolf Electric Tools, Ltd., Pioneer Works, Hangar Lane, London, W.5.—Catalogue of electrically operated portable tools.

South African Convention

INDUSTRIAL PROSPECTS AND PROBLEMS

THE pattern of electrical progress in South Africa and the territories to the north was outlined and discussed at the 23rd convention of the Municipal Electricity Undertakings of Southern Africa held recently at Port Elizabeth and attended by 300 delegates and guests.

Two present handicaps are the serious shortages of skilled labour and plant, the position as regards the latter being accentuated by the Union Government's announcement that in the second half of the year South Africa will not even have enough money to pay for essential raw materials and machinery from overseas.

The education and training of men for industry was the theme of the valedictory address of Mr. A. Foden, the retiring president (read in his absence overseas by Mr. C. Kinsman). Mr. Foden, who is city electrical engineer of East London, is a firm believer in the "sandwich" system of training. He said that not only in South Africa but also in Great Britain there appeared to be a lack in the engineering educational make-up. Under the existing system there was no responsible position which college-trained engineers could occupy between the end of their college training and practical training in power stations and the taking up of of an executive position.

Mr. D. A. Bradley, city electrical engineer of Port Elizabeth, in his presidential address, expressed the opinion that it would be a further three years before the present labour shortage was remedied. The specialized nature of electricity supply work called for men of particular ability and adaptability, and an increasing number of apprentices should be trained, particularly in the larger undertakings.

Throughout the Union progress was handicapped, indeed was being retarded, by the inability to obtain heavy plant for power generation. The increase of population and the exceptional growth of industry in the past three years had made demands that had taxed supply authorities to the utmost, and it was only by improvization and the loyalty of the staff that they had been able to maintain continuity of supply.

The long-term outlook was sketched by Dr. J. H. Dobson, one of the founders of the A.M.E.U. He contended that if full advantage was taken of present opportunities, African industry could travel far along the road of progress and achievement. He referred to the new goldfields, vast coal resources, mineral production and large steelworks developments, mentioning also the big hydro-electric schemes at Kariba and Kafue Gorges in the Rhodesias and further north the plan to harness the Nile. The present financial position of South Africa required earnest consideration. It should not be treated lightly, but he regarded it as a passing phase.

Gauging the efficiency of electricity undertakings, rate contributions and other controversial subjects were commented on in a paper by Mr. H. Jasper Gripper, assistant city electrical engineer of Port Elizabeth.

E.I.B.A. Deficiency

WE regret to hear from Mr. H. Senior Fothergill, secretary of the Electrical Industries Benevolent Association, that the Association is £1,450 down on its income "target" for the first seven months of 1949, only £17,800 having been received instead of the amount of £19,250 needed. Actually the position is much worse than it would appear from these figures, for included in this £17,800 is the B.E.A.'s and Area Boards' joint subscription of £5,000, which should be spread over the whole year to obtain a true comparison.

Other amounts of £50 and over included in the July income were: Morgan Crucible Co., Ltd., £50; Jackson Electric Stove Co., Ltd., £60; Johnson & Phillips, Ltd., £200; Ferguson, Pailin, Ltd., £50; English Electric Co., Ltd., £500; B.T.H. Co., Ltd., £500; Allen West & Co., Ltd., £200; B.E.A.M.A., £200; and Bruce Peebles & Co., Ltd., £100.

National Golf Championship

The London Area finalists of the Electrical Industries National Golf Championship (hon. secretary, Mr. A. H. Hughes, Room 233, 21, Bloomsbury Street, W.C.1) will be competing for the area trophy at the R.A.C. Country Club, Woodcote Park, Epsom, on 18th August. The winners of each area trophy, together with the runner-up and best scratch score competitor, will be entitled to compete in the National Championship which will again be held at Moor Park in early October.

International Committee on Welding

AT the recent conference in Paris of the International Organization for Standardization (I.S.O.), the Technical Committee on Welding met for the first time under the chairmanship of M. Leroy, director of the Institut de Soudure, who was nominated in accordance with custom from the delegation of the secretariat country, France.

Seventeen nations were represented, the United Kingdom delegation being organized through the British Standards Institution. The chairman recommended the adoption of the work of the former International Standards Association committee as a basis for future work and he mentioned that the International Electrotechnical Commission had passed over the work of its own standardization committee to I.S.O. with a desire to be informed of progress.

Some discussion took place on the relationship of the new committee to the International Institute of Welding, and a formal resolution was eventually adopted expressing the intention of the committee to refer to the I.I.W. specific technical questions on which existing national standards, or other documentation at its disposal, did not appear to be a sufficient technical basis of work.

In a discussion on welding definitions and symbols the view was expressed that a combination of the American and Swedish proposals might lead to a very satisfactory international system. A sub-committee was formed to examine and submit fresh data and suggestions.

There was an inconclusive discussion on the specification of weldability, but recommendations were made as to the chemical specification and the desirability of early standardization of mechanical tests of the base metals. The committee agreed that a specification of weld quality should be a prior part of its future work.

On the question of electrodes and filler rods, a resolution was adopted recommending a diameter series based on the existing I.S.A. series of preferred numbers.

The following sub-committees were formed, on all of which the British delegation requested representation: symbols and joint nomenclature, definitions of weld positions, design calculations, electrodes and filler rods, arc welding equipment and weld quality.

B.S.I. Specifications

FILAMENT lamps used in marine lighthouses and for similar beam projection purposes are rationalized by the issue of B.S. 1546, which now schedules 100 V for normal service, 50 V for stand-by battery operation and 240 V for instances in which energy is purchased from the public mains. Eighteen types of a.c. single-phase and d.c. lamps with three a.c. three-phase types are provided for, as is also the use of prefocus holders with a mounting ring on the cap for adjusting the filament position in the projector. The schedule deals with various forms of filament and how it is affected by voltage variation, while some of the cap dimensions now specified are new.

Telegraph-line materials are dealt with in a revised edition of B.S. 16, which prescribes the dimensions and mechanical testing of metal fittings and electrical tests for insulators, some of the war-emergency designs having now become standard.

Reels and wooden drums for bare wires are the subject of B.S. 1559, the particulars being based on the recently issued B.S. 1489 for covered winding wire reels.

Copies are obtainable at 3s, 7s 6d and 2s respectively from the British Standards Institution, 24, Victoria Street, London, S.W.1.

Store Lighting

The installation at Bentalls, Kingston-on-Thames incorporates false illuminated beams with flushed-over glass sides and curved grilles on the underside

THE lighting of stores, shop windows and showcases, besides providing a somewhat different problem from that encountered in factories and offices, offers much more scope for architectural and decorative treatment. Alive to the growing demand for fluorescent lighting in these commercial applications, Courtney, Pope (Electrical), Ltd., Amhurst Park Works, South Tottenham, N.15, have set up a series of demonstration rooms to show the effect of specialized lighting to their prospective customers.

This method complies with the established policy of the company of keeping up to date with new developments in illumination technique and practice, and its development engineers are always seeking new methods of improving the appearance as well as the efficiency of lighting installations. Each installation is planned to suit individual conditions, even to the extent of designing special fittings. In addition to the important work of designing and supplying new lighting installations, the company has many contracts for modernizing existing lighting.

Several interesting installations have recently been carried out or are in hand, each demanding a particular approach having regard to the special requirements of the premises. At Selfridges, Oxford Street, London, fittings were required which would harmonize with the surroundings on the ground floor and basement, and third floor with emphasis on correct colour mixing. In consultation with Mr. R. L. Heath, house architect at Selfridges, over a hundred "Amhurst" louvre fittings with specially designed grilles have been installed, each comprising five 80 W fluorescent tubes.

An entirely different form of architectural treatment is to be seen at Bentalls, Kingston-on-Thames, where false illuminated beams have been installed with flushed-over glass sides and curved grilles on the underside. To emphasize special items of merchandise, gimbal rings are let into the beams at intervals. "Hyliter" swivel spotlights with colour filters are employed in the windows to focus attention on particular articles. A similar arrangement can be seen at Dorothy Perkins in Kensington where "Flouvres" are used. These simple aluminium attachments clip directly on to the tubes. They reduce glare and minimize eye-strain, and give a pleasing modern appearance to the bare tubes, at low cost.

Louvre fittings with special grilles have been installed at Selfridges

NEW BOOKS

Electricity. By C. L. Boltz, B.Sc. Pp. 311, figs. 150, index. George G. Harrap & Co., Ltd., 182, High Holborn, London, W.C.1. Price 8s 6d.

Popular manuals on electrical technology tend to be very much alike, and to give more attention to description than to basic theory. This book is to be specially commended because of the care the author has taken to expound underlying principles simply and non-mathematically. His historical notes on the work of the pioneers are also quite good.

In contrast to the account of underlying theory, the descriptive matter is not well balanced. Although there is a full description of galvanometers and directions for making one, the account of electrical instruments is too sketchy to be of much use to the beginner. The same applies to the brief section on electric motors,in which induction and synchronous machines are mentioned before alternating currents are explained.

The chapter on electrical installations is very good, but the author ought here to have explained the underlying principles of earthing more fully and in place of the detailed description of such familiar components as switches and fuses, he might well have described the earth-leakage circuit breaker. The explanation of Joule's law is deferred to the last chapter on electric heating, and, perhaps because of this, the author has given a rather abstract explanation of r.m.s. values of electrical quantities, instead of the more easily grasped concrete explanation based upon average heating effect. However, no popular work is beyond criticism, and this is one of the best books of its kind.—G. W. S.

Metals and Alloys. (Fifth edition) pp. 214. The Louis Cassier Co., Ltd., Dorset House, Stamford Street, London, S.E.1. Price 15s.

The alloys of which the specifications are listed in this book are those usually regarded as non-ferrous and are limited to those containing not more than 50 per cent of iron. Most of them have definite "names" and the book includes those proprietary alloys of which the names have been published and many other alloys which although not proprietary, or no longer so, usually have a recognized composition. In addition a good many alloys to which specific names are not attached have been inserted under appropriate headings indicating the purposes for which they are suitable. Some 4,600 compositions are covered, which represents a complete revision of the previous list and involves the rejection of a great many alloys known with certainty to be no longer manufactured. The list is a reasonably complete one and is considerably in advance of any of its forerunners, with a corresponding advance in industrial utility.—R. P.

Careers in Local Government and Allied Services. By J. B. Swinden (Pp. 180). National Association of Local Government Officers, 1, York Gate, Regents Park, N.W.1. Price 7s 6d.

This is intended as a guide to young people contemplating entry into local government service. It gives an idea of the qualities and qualifications demanded and deals generally with all phases of the service. Then the individual departments are studied and particulars are given of training courses and professional qualifications.

Since nationalization of electricity supply electrical interest has swung away from local authorities to the British Electricity Authority and Electricity Boards. A special section is devoted to this service but as it is almost wholly concerned with the training of electrical engineers and membership of the I.E.E. it is not really a guide. Too much stress is laid on salaries; the nature of the work is neglected.—J. H. C.

Einführung in die Elektrotechnik. By E. Dünner. Pp. 476+X, figs. 417, index. Rascher Verlag, Zürich.

This introduction to electrical technology contains an extended version of lectures given by the author at the Federal Technical Institute, Zürich, to mechanical engineering students whose position in later life will essentially be that of users of electrical equipment.

In a task of this kind the difficulty is obviously one of selection and emphasis. The reviewer believes that there was no need to trouble the student with the symbols div and rot of vector notation, nor to devote more than seven pages to a detailed exposition of a method for the calculation of the deflection of the shafts of generators. Vector notation and complex notation are used freely, and principles of electrical measurements and distribution are also discussed. Fundamentals of electronics are included but gas discharges (apart from six pages on rectifiers) are omitted. The opportunity of presenting the principles of illumination or heating has been missed. The book is—like all Swiss books—excellently produced and on the whole very readable.—A. B.

Reports and Dividends

The General Electric Co., Ltd.—The report and accounts, which have now been published, show a consolidated profit on trading of £4,976,810 for the year ended 31st March last, as compared with £5,501,181 for the preceding year, to which is added income from investments of £140,848, making £5,117,658. From this the following charges are deducted:—Depreciation, £827,708; remuneration of directors of holding company (including fees as directors and executives), £124,297; pension fund contribution, £224,886; auditors' remuneration, £9,500; provisions for unascertained liabilities, £132,660; provisions for depreciation of trade investments, £17,000; interest on secured loans, £5,103.

The aggregate profit, before taxation and proportion attributable to minority shareholders in subsidiary companies, is £3,776,504 (against £4,471,730). Taxation requires £2,262,260, and profit attributable to minority shareholders in subsidiary companies, £27,113, leaving a consolidated net profit for the year, attributable to the holding company of £1,487,131 (against £1,758,010), of which £1,225,351 comes into the accounts of the holding company. To this is added the balance of undistributed profits brought forward and income received relating to previous years, making a total available of £2,321,150. It is proposed to transfer to reserve against future stock depreciation £500,000, and to reserve for increased cost of plant replacement, £6,487. As already announced, the dividend for the year on the ordinary stock is 10 per cent, and the bonus 7½ per cent (both unchanged). The balance carried forward is £1,225,220.

The report states that the profits for the year, though less than for the previous year, are satisfactory. Fluctuations in demand and the return to competitive conditions, particularly during the latter part of the year, have tended to a reduction of profit. During the year three subsidiary companies have been formed, namely, Machlett X-ray Tubes (Great Britain), Ltd., the General Electric Co. of India (Manufacturing), Ltd., and the General Electric Co. of Pakistan, Ltd. Electric Development and Securities Trust, Ltd., was nationalized on 1st April, 1948, and the holding company's interest therein was liquidated. The profit of £2,506,839, resulting from thirty years' prudent management, has been placed to capital reserve.

During the year sales have continued at a high level, but there has been a definite fall in some departments in the value of orders received. Exports have again created a record and were considerably in excess of the target figures fixed by the Government. The overseas companies have shown satisfactory results. Extensions are in course of construction at the heavy electrical and mechanical engineering works in order to cope with the demand for capital goods and considerable progress is being made in plant re-equipment. This expenditure, coupled with the increase in their export business and the large volume of stock and work in progress, has meant a heavy drain on the financial resources. Further considerable capital expenditure has been authorized by the board. The necessity for additional finance, referred to in the last report has, since the close of the year, been met by the issue of £8,000,000 3½ per cent ten-year unsecured loan stock, 1954-59, at 99 per cent. The money will be used in the main to pay off the bank overdraft. The number of employees at 31st March last was approximately 54,000.

The Nigerian Electricity Supply Corporation, Ltd., has announced a final dividend of 6 per cent, maintaining the distribution for the year at 10 per cent.

Electrical Components, Ltd., reports total group earnings for nine months to 31st March last (including subsidiaries for twelve months) of £108,850. This compares with £156,259 for the previous twelve months for all companies. The available profits for the parent company total £90,029, and after providing for taxation, reserves, etc., it is proposed to pay a final dividend of 5½d per share, making 9d for the nine months (equivalent to 20 per cent per annum, as last year). The balance carried forward is £26,650.

Newton Brothers (Derby), Ltd., report a trading profit for the year ended 31st March last of £84,421, as compared with £81,974 for the preceding year, to which is added investment income of £1,891. After providing for directors' remuneration, taxation, depreciation, etc., there is a net profit of £28,893 (against £31,781), which with credits from previous years and settlement of outstanding royalties matters of £17,520, and £15,092 brought in, makes £61,505. General reserve receives £35,000, and the dividend for the year is maintained at 17½ per cent, with a bonus of 7½ per cent. The balance carried forward is £15,644.

Subject to the consent of the Treasury it is proposed to capitalize £78,992 of the

general reserve of £80,000 by the free issue of one fully paid share of 2s. for each share held, in order to bring the issued capital somewhat more into line with that employed in the business and to restore in part the drastic capital reduction in 1936.

Hick, Hargreaves & Co., Ltd.—Speaking at the annual meeting on 28th July, Mr. W. D'Arcy Madden (chairman), said that the British Electricity Authority continued to be their principal customer and orders on their books for condensing plant and feed heating equipment included plant for the programme year 1953 exceeding in capacity 1,200 MW. The other departments also had work in hand for many months ahead. While the order book to-day was satisfactory new orders were fewer and more difficult to secure and the prices obtainable were less remunerative.

Telephone Rentals, Ltd., reports a rental revenue for 1948 of £859,214, as compared with £711,645 for 1947, and other income of £146,889 (against £131,771). The net profit is £322,034 (against £264,381). After providing for taxation (£134,418), and placin £50,000 to contingency reserve, £20,000 to general reserve, and providing £10,000 for supplemental pensions, it is proposed to pay a final ordinary dividend of 6 per cent, again making 10 per cent for the year, and to distribute £32,927 to employees under the participation scheme. The balance carried forward is £73,649 (against £53,960 brought in).

New Companies

R. V. Burnett, Ltd.—Registered 3rd August. Capital £2,000. Electrical, radio, television and mechanical engineers and contractors, etc. Directors: R. V. Burnett and R. W. West. Reg. office: 139, Church Road, Burgess Hill, Sussex.

Stamford Electric Sales, Ltd.—Registered 30th July. Capital £100. Electrical and mechanical engineers, contractors and manufacturers, etc. Directors: E. D. Basden, W. H. Freeston and E. F. G. Hanebeck. Reg. office: Park Works, Stamford.

W. B. P. Radio, Ltd.—Registered 30th July. Capital £20,000. Manufacturers of and dealers in radio, television and electrical apparatus, etc. Directors: W. A. Penfold, H. J. Wilson, G. P. Wilson and J. F. Barber. Reg. office: 32, Windmill Street, Gravesend, Kent.

Cotswold Electric, Ltd.—Registered 27th July. Capital £3,000. To acquire the business of wireless and general electrical construction, maintenance and supply engineers carried on by H. A. Allen, A. J. Taylor, G. P. Upton, H. E. Allen and J. S. Thomas, all of Burford and Leafield and elsewhere in Oxon, as Burford Radio & Electrical Services. Directors: H. A. Allen, A. J. Taylor, G. P. Upton and J. S. Thomas. Regd. office: High Street, Burford, Oxon.

E. M. Tatton & Co., Ltd.—Registered 9th July. Capital £1,000. Electrical engineers and contractors, etc. Directors: E. M. Tatton and Lilian Tatton. Regd. office: 59, Kew Bridge Road, Brentford.

Horstar Electrics, Ltd.—Registered 30th July. Capital £100. Manufacturers of and dealers in dynamos, motors, armatures, and electrical plant and supplies, etc. Directors: E. C. Horler and F. W. Starbuck. Regd. office: Broad Street Station, E.C.2.

J. H. Hickling, Ltd.—Registered 30th July. Capital £5,000. Electrical engineers and general electrical installation contractors, etc. Directors: J. H. Hickling, Mrs. Emma M. Hickling and J. K. Hickling. Regd. office: 19a, Church Gate, Loughborough.

Portland Engineering Co., Ltd.—Registered 30th July. Capital £100. Manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos and batteries, electrical and mechanical engineers, etc. Subscribers: G. G. Shipton and Mary Emmerson. Regd. office: 9, St. John's Lane, Halifax.

Law Electric, Ltd.—Registered 28th July. Capital £100. Electrical engineers and contractors, manufacturers of and dealers in electrical and mechanical apparatus and accessories, particularly radio sets, valves, television sets, etc. Directors: F. L. Law and A. D. Law. Regd. office: 48, Rokeby Rd., Brockley, S.E.

Felcot Engineering Co., Ltd.—Registered 30th July. Capital £100. Manufacturers of and dealers in electrical appliances and apparatus, electronic and television engineers, etc. Directors: S. A. F. Phelps and Mrs. F. C. Phelps. Regd. office: 68B, Springbank Road, Hither Green, S.E.13.

S. J. Adams & Son, Ltd.—Registered 29th July. Capital £3,000. Electrical engineers and general electrical installation contractors, etc. Directors: A. T. Adams and B. A. Adams. Regd. office: 26, Cambridge Street, Wellingborough.

Howrey & Co. (London), Ltd.—Registered 29th July. Capital £100. Manufacturers of and dealers in all types of electrical apparatus, fittings and appliances, etc. Directors: E. C. Rey and R. Howell. Regd. office: 53, High Street, Penge.

Childrey Electrical Co., Ltd.—Registered 29th July. Capital £100. To acquire the business of general electrical engineers and contractors and retailers of electrical equipment carried on by the Childrey Building

and Electrical Co., Ltd., at Grove Street, Wantage, Berks. Directors: M. Scott and W. Scott. Regd. office: 3, Cork Street, Reading.*

Ron Burns (Electrical Engineers), Ltd.—Registered 6th July. Capital £100. Directors: Fanny Burns and R. Burns. Regd. office: 141, East Road, N.1.

Increases of Capital

Enfield Cables, Ltd. — Increased by £800,000, in 500,000 4½ per cent cumulative second preference and 300,0000 unclassified shares of £1 each, beyond the registered capital of £1,200,000.

J. J. Smith & Co. (Engineers), Ltd.—Increased by £18,000 in 5,000 "A" ordinary and 13,000 3 per cent cumulative preference shares of £1 each, beyond the registered capital of £5,000.

Vent-Axia, Ltd.—Increased by £45,000, in 1s ordinary shares, beyond the registered capital of £15,000.

Cantie Switches, Ltd. — Increased by £93,000, in £1 undefined shares, beyond the registered capital of £7,000..

Liquidations

The Withy Trees Electrical Co., Ltd.—Creditors' voluntary winding-up. Meetings 2nd September at 7, Winckley Square, Preston, to receive an account of the winding-up by the liquidator, Mr. H. Cumming.

Prince's Electrical Clocks, Ltd.—Members' voluntary winding-up. Particulars of claims to the liquidator, Mr. D. H. Whinney, 4B, Frederick's Place, Old Jewry, London, E.C.2, by 19th August.

Harcourts, Ltd. — Members' voluntary winding-up. Particulars of claims to the liquidator, Mr. D. Q. Holland, Crown House, Aldwych, London, W.C.2, by 26th August. All known creditors have been or will be paid in full.

Associated Electrical Industries, Ltd., announced earlier in the year that its subsidiary, the Edison Swan Electric Co., Ltd., would absorb Harcourts, Ltd., another subsidiary, as from 1st April last.

Southern Wholesale Electrical (Hove), Ltd.—Winding up voluntarily. Liquidator, Mr. A. E. Orbell, 6 and 7, Old Steine, Brighton.

Bankruptcies

S. H. E. Ledbrooke, 8, Fore Street, Teignmouth, Devon, electrician.—Receiving order made 26th July, 1949, on a creditor's petition.

N. A. Peters, carrying on business at 192, Robin Hood Lane, Hall Green, Birmingham, electrical and wireless engineer.—Order made 29th June granting discharge as from 29th July, 1949, subject to bankrupt consenting to judgment being entered against him in the Birmingham County Court for £200 payable forthwith. (Note: £200 paid to Official Receiver in lieu of entering judgment.)

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 3rd August:—

RUBANOX.—No. 654,727. Class 9. Electrical apparatus and instruments included in Class 9. Rubanox, Neuilly-sur-Seine, France. Address for service, c/o Marks & Clerk, 57-8, Lincoln's Inn Fields, London, W.C.2.

ADASTRAL.—No. 658,564. Class 9. Radio aerials. Northern Electronic Industries, Ltd., Windsor Works, Manchester Street, Oldham.

OLIVETTI.—No. B688,878. Class 9. Telegraphic printing apparatus and telegraphic transmitting apparatus; and apparatus for recording data on paper tape by means of perforations, the perforated tape being for use in telegraphic transmitting apparatus; and parts of and fittings for all such apparatus, all included in Class 9. Ing. C. Olivetti & C.S.p.A., Ivrea, Italy. Address for service, c/o Reddie & Grose, 6, Bream's Buildings, London, E.C.4.

SECTRIC.—No. 669,391. Class 9. Radio receiving sets (complete) and electric time switches; and electrical apparatus incorporating alarm clocks and time switches for use in making tea at a predetermined time. Smith's English Clocks, Ltd., Cricklewood Works, Edgware Road, Cricklewood, London, N.W.2.

AUSWAL PRODUCTS (design).—No. 672,471. Class 9. Electric transformers. No. 672,472. Class 11. Installations for lighting. No. 672,473. Class 14. Electric clocks. Austin Walters & Son, Ltd., Ayres Road, Old Trafford, Manchester, 16.

AWCO.—No. 674,388. Awco (design).—No. 674,391. Class 9. Electric fuse wire, insulated wire and electric cables. Aluminium Wire & Cable Co., Ltd., Port Tennant Works, Crymlyn Burrows Road, Port Tennant, Swansea.

ALADDIN.—No. 674,931. Class 9. Magnetic cores for use in radio apparatus. ALADDIN.—No. 675,308. Class 9. Formers for coils in wireless telegraphic, telephonic and television apparatus. Aladdin Industries, Ltd., and Aladdin Radio Industries, Ltd., Aladdin Building, Western Avenue, Greenford, Middx.

UMBRAWIN.—No. 675,166. Class 9. Radar apparatus. Suchy Holdings, Ltd., 62-64, Temple Chambers, Temple Avenue, London, E.C.4.

TEXAGEN.—No. 676,246. Class 9. Electrical apparatus and instruments included in Class 9, wireless sets (complete), barometers and weighing machines. Textile & General Supplies, Ltd., 76, Chancery Lane, London, W.C.2.

PEARLCO.—No. B672,069. Class 11. Electric lamps and lamp reflectors. H. Feneron, Charlotte E. E. Feneron, H. B. Feneron and K. C. S. Feneron, trading as the Pearl Electrical Co., Pearl House, Crown Street, Acton, London, W.3.

STOCKS and SHARES

STOCK Exchange markets have indeed fallen upon dull and depressing days. The principal feature is the pronounced weakness in British Government securities and in all others which look, more or less, to the Consol Market for a lead. The economic crisis remains with us, and likely, so far as can be seen, to continue until the middle of September. Each fall in prices simply serves to accentuate the previous nervousness, and to restrain still further the inclination to employ surplus funds in the purchase of front rank securities. The gilt-edged ordinary stocks hold their prices tolerably well. Fluctuations since a week ago in the prices of electrical issues are few and mostly insignificant, but both the British Electricity stocks have fallen heavily during the week, the 1974-77 issue being 92½ and the 1968-73 stock a point higher. British Transport "threes" slumped to 89½.

Falls on the Week

Walsall Conduits are ⅛ lower at 56s 3d. Johnson & Phillips, 62s, have lost 1s. Electric Constructions, 49s 6d, Ever Ready, 27s 6d, Crabtree, 32s 6d, and London Electric Wire, 44s, show falls of 6d each. Vactric at 11s 3d are down 2s 6d. In the radio group, E. K. Cole at 11s have gone back a few pence. Telephone Manufacturing at 8s 6d are a shade easier. On the other hand, Babcock & Wilcox at 56s are a little better. Amongst the higher priced stocks, British Electric Traction deferred at 1545 is 30 points down. International Combustion, at 43s 9d, are unaffected by the proposal to issue bonus shares.

Babcock's New Issues

The Babcock & Wilcox new issues encountered market conditions virtually prohibitive to the success of a capital offer. Underwriters were consequently called on to take up a substantial proportion of both the ordinary and preference shares. Offered at 57s 6d (and at present 20s paid up) the former stand now at a discount of about 6d. The prospective yield of over 5¼ per cent looks out of line with other industrials of similar rank, particularly as the allotment letters will be obtainable free of transfer stamp until the middle of next month. The 4 per cent preference shares (10s paid) are quoted at 1s under par, the price of the issue, and yield £4 4s 3d per cent.

G.E.C. Report

From General Electric's full accounts the market draws the conclusion that the lighter engineering products of the group were mainly responsible for the 15 per cent reduction in the aggregate profit. In the balance sheet, interest is centred on the tendency for stocks to increase as a result, on the one hand, of smaller demands for consumer goods, and, on the other hand, of the heavy order book for capital equipment. Altogether, this item in the balance sheet has expanded by more than £5¼ millions. On the other side, the overdraft appears at over £7 million, but the company made its £8 million issue of 3½ per cent loan stock after the books were closed. An interesting point is the transfer to reserves of a £2½ million surplus arising from the passing of the electricity supply interests. Now 81s 6d, yielding £4 5s per cent, the ordinary shares are maintained, by the general tenor of the report, in the front rank of the industrial market.

Joseph Lucas

This company's financial year ended with July: the results were published last time in November. Group earnings on the ordinary capital of just over £2 millions came out on that occasion at 55 per cent. against the 17½ per cent paid. They included some subsidiary accounts for periods over 12 months, but were evidently struck on conservative lines. Reserves and surplus, including replacements but not the other specific reserves, appeared in the balance sheet at well over three times the issued ordinary capital. Net liquid assets exceeded £8 millions. With the qualifications of an industrial "blue-chip," the shares have, nevertheless, lost nearly £1 of their highest value this year. Now 72s 6d, they pay £4 16s 8d per cent on the last rate of dividend.

Cable & Wireless

Some idea of the narrowness of markets under present-day conditions can be gained by reference to the fluctuations in Cable & Wireless ordinary stock. One day last month, for instance, the price rose 10 points, which was due, according to dealers in the market, to pressure of two or three biggish buyers, and to the fact that the market at that time was scantily supplied with stock. The rise evidently attracted sellers who, it may be, were rendered nervous by the continued drop in the prices of gilt-edged stocks. Cable & Wireless ordinary accordingly fell from 236 to 228 which, since a week ago, is 2½ points down. The preference, at 111, has regained a point.

Meanwhile, the Cable & Wireless (Holdings) board has informed holders of the hope that by, at the latest, mid-October next, there will be in the hands of stockholders the balanced scheme of reconstruction referred to at the annual meeting

Electricity Supply

New Station at Battersea? Overhead Line Opinions

A JOINT meeting of the Finance, Works and Highways Committees of Battersea Borough Council has considered a proposal by the British Electricity Authority to acquire the whole of the Council's Falcon Wharf and other premises adjoining the Electricity Authority's wharf as part of a site for the purpose of constructing a new generating station. The Authority's proposal is to build a new station on the river frontage covering the area bounded by the river on the north, Lombard Road on the south, the West London Extension Railway on the east, and the western boundary of Falcon Wharf on the west, with a coaling jetty in the river. The site of the existing generating station buildings on the south side of Lombard Road would be used mainly as a coal store. The Council's premises at Falcon Wharf comprise transport depot; refuse disposal depot and barge wharf; highways depot and plant store; waste paper depot; general stores; and weighbridge, mortar mill and residence. The Committee has given preliminary consideration to the proposals, and while sympathetic to the requirements of the B.E.A. is faced with the difficulty of providing alternative accommodation with a similar river frontage for the Council's own services. A special sub-committee is to be appointed to consider the proposals in detail, with reference to the financial aspect and to the possibility of nuisance arising from fumes, smoke and coal dust.

Lines in National Parks

The question of power lines through national parks was again raised at the last meeting of the North Western Electricity Consultative Council. Councillor A. C. Cropper, Kendal, has written expressing the view that there was little real difference in attitude between thinking people on both the Board and County Councils, and that in consumers' interests representatives of both should meet to agree on a principle. Sir Joseph Hallsworth, chairman of the Board, replied that the talks suggested would not be appropriate at present. So far the Board had had no difficulty in making mutually satisfactory arrangements with the County Councils. Moreover, these agreements would not be binding on the National Parks planning authorities.

Four of the proposed parks are likely to cover 27 per cent of the Board's area in which there are already 202 miles of grid transmission lines. It would cost £3,000,000 to replace these with underground cables, and £2,500,000 to extend the system compared with £900,000 for overhead lines. Rural development would be seriously slowed down; three times as many farms could be connected in a year using overhead lines. The Consultative Council expressed the view that the cost of power lines through parks should be a national charge.

Overhead Line Design

Surrey Planning Committee recently asked the British Electricity Authority to adopt a standard design for overhead lines, pointing out at the same time that it preferred all cables to be underground. In reply, the B.E.A. referred to the need for overhead lines in rural areas for reasons of economy and meeting the demand. Grid transmission lines and towers were standardized 20 years ago, when the views of an eminent architect were sought. Distribution lines were mainly the concern of the Area Electricity Boards and, while the advantages of standardization were realized, it was essential that under present conditions full use should be made of whatever material was available.

Hills and Valleys

When applications by the South Western Electricity Board for permission to erect overhead lines came before the East Cornwall Planning Committee at Liskeard, Major C. A. E. Chudleigh said that they wanted the "electricity people" to seek out the valleys and keep off the Cornish skylines. In Dorset, hills had been ruined by pylons. The county planning officer (Mr. H. W. J. Heck), replying, said that they were now reaching a stage of fairly close liaison with the electricity authorities.

Sheffield's Street Lamps

At the end of March last there were 14,093 electric and 12,410 gas street lamps controlled by Sheffield Lighting Department, the corresponding figures two years before (the date of the previous report) being 13,210 and 12,563. One matter referred to by the public lighting engineer, Mr. J. F. Colquhoun, is the extra maintenance caused by the increasing dirtiness of the atmosphere—in one district the pollution rose from 27.98 tons per square mile a month in 1936 to 40.49 tons in 1947. Formerly the lamps were cleaned *in situ*, but now the parts have to be taken to the

workshops. Mr. Colquhoun, who has been the city's lighting engineer for 25 years, is retiring next February.

Tariff Standardization

Hazel Grove and Bramhall (Cheshire) U.D.C. is asking the North Western Electricity Consultative Council to press for the early adoption of a standardized tariff throughout the area. The U.D.C. has expressed dissatisfaction with the high electricity charges in the district.

Hams Hall Pollution Complaints

With reference to complaints of atmospheric pollution from Hams Hall generating station, Meriden R.D.C. has been informed that owing to major repair work half of the plant has had to be operated without electrostatic precipitators. At the present time 75 per cent of the work has been completed and it should be finished within the next twelve months.

Greenock Five-Year Plan

Although the Ministry of Transport has refused to make a grant towards the cost, Greenock Corporation is to go ahead with its five-year plan for relighting the main thoroughfare, estimated to cost £20,000. The first stage, a two-mile section between the Gourock boundary and Campbell Street, will be lighted by 87 140 W sodium lamps on 25ft standards.

I.o.M. Breakdown

Due to a breakdown at Douglas, the supply of electricity throughout the Isle of Man was interrupted for about an hour on 28th July.

Change-over Scheme

Douglas (I.O.M.) Corporation has approved of a scheme for a progressive change-over from d.c. to a.c. in its area of supply. The approximate cost (at present-day prices) is £388,900, and it is planned to complete the work by 1957-58.

Higher Charges in Guernsey

Electricity charges in Guernsey are to be increased by 25 per cent from next January.

Lighting Contract

Wotton-under-Edge (Glos) Council has placed a five-year contract for street lighting with the Midlands Electricity Board. The price quoted by the Board was £381 for 91 lamps. During recent years the streets have been illuminated by gas but this year no tender was available from the gas undertaking.

Electricity Output

During the week ended 30th July last 611.9 million kWh was sent out from solid-fuel fired stations of the B.E.A. and North of Scotland Hydro-Electric Board, compared with 714.6 million kWh in the previous week and 580.5 million in the week ended 31st July, 1948.

Loan for Finland

It was announced last week that Finland is to receive a loan of £3,125,000 from the World Bank in Washington for modernizing and reconstructing her timber industry, developing electric power, and expanding the production of limestone powder.

Improved Lighting

Pewsey Rural District Council has adopted a recommendation of its Lighting Committee for replacing the existing street lamps at Ludgershall and Pewsey by the fluorescent type at a cost of £1,042. Lighting schemes are proposed for Netheravon, Fittleton, Burbage and Collingbourne Ducis.

Change-over at Hamilton

It has been decided by the South West Scotland Electricity Board to proceed at once with the change-over of the remaining d.c. consumers at Hamilton.

TRANSPORT

Hull Jubilee

This year marks the jubilee of municipal transport in Hull. It was also fifty years ago that the first electric trams were operated (5th July, 1899) on the Anlaby Road and Hessle Road routes. Trolley-buses made their appearance in July, 1937, and it was intended to complete the conversion by 1942, but this was delayed by the war until July, 1945.

Wolverhampton Deficit

For the first time in the history of the Wolverhampton transport undertaking there was a net operating deficiency last year, amounting to £31,054. The 1948-49 accounts of the undertaking (general manager and engineer, Mr. C. Owen Silvers) show a gross trading profit on trolley-bus working of £34,928, while there was a loss on the motor-buses of £1,528, before allowing for loan charges, etc. The trolley-buses carried 83 million passengers, who paid an average fare of 0.936d per mile. Motor-buses carried 27.8 million passengers, the average fare per mile being 1.043d.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

2167. Patelhold Patentverwertungs- & Elektro-Holding Akt.-Ges.—Means for regulating the saturation current of hot cathode tubes. 27th February, 1943. (626686.)

2438. General Electric Co., Ltd., and James, E. G.—Constructions of thermionic valves with circuit elements. 9th February, 1944. (626687.)

1945

4268. Hayward Tyler & Co., Ltd., Howard, G. P. E., and Ivanoff, V.—Submersible motors. 20th February, 1945. (626609.)

10870. British Thomson-Houston Co., Ltd., Bowen, A., and Till, L. J.—Kinematograph projectors. 30th April, 1945. (626925.)

11307. Sharpe, B. A.—Frequency modulation radio altimeters. 3rd May, 1945. (626610.)

11730. British Thomson-Houston Co., Ltd.—Inductor frequency changers. 10th May, 1944. (626611.)

17564. Mozzanini, G. G., and Lebertre, M.—Direct-current motors for obtaining a rapid rise in speed thereof. 1st May, 1942. (626613.)

21703. British Thomson-Houston Co., Ltd., and Bowen, A.—Lens mounting for kinematograph projectors. 24th August, 1945. (626929.)

22367. British Thomson-Houston Co., Ltd.—High-frequency electric capacitors. 1st September, 1944. (626620.)

23397. British Thomson-Houston Co., Ltd.—Dynamo-electric machines. 16th September, 1944. (626622.)

23860. Murphy Radio, Ltd., and Balean, J. H.—Loud-speakers. 15th September, 1945. (Cognate application 27739/46.) (626623.)

30390. Raytheon Manufacturing Co.—Magnetrons. 10th March, 1945. (626930.)

33549. Sperry Gyroscope Co., Inc.—High-frequency attenuating devices. 25th July, 1942. (Divided out of 617236.) (626632.)

33645. General Electric Co., Ltd., and Friedlander, E. S.—Protecting means for alternating-current circuits. 22th December, 1945. (626633.)

1946

2997. General Electric Co., Ltd., and Caldwell, J. T.—X-ray apparatus combined with high-voltage supply means. 30th January, 1946. (626935.)

3612. Philco Radio & Television Corporation.—Antenna systems. 3rd August, 1944. (626937.)

3619. Standard Telephones & Cables, Ltd., Earp, C. W., and Strong, C. E.—Radio navigation systems. 5th February, 1946. (626938.)

4728. Pelle, P.—Telegraphic transmitters. 16th February, 1945. (626939.)

5311. Ausenda, C.—Radio transmitting antenna. 15th May, 1941. (626638.)

5890 Faudell, C. L.—Electrical integrating circuits. 20th February 1946. (626941.)

7498. Sicular, H.—X-ray radioscopic detection apparatus. 11th March, 1946. (626697.)

14035. Philips Lamps, Ltd.—Magnetic cores. 24th October, 1941. (626946.)

14647. Eastman Kodak Co.—Electronic apparatus for measuring the variation or movement of a magnetic field and particularly for measuring the relative position of two objects. 15th May, 1945. (626947.)

15016. Standard Telephones & Cables, Ltd., and Garfield, W. L.—Arrangement for monitoring the frequency of an alternating current. 17th May, 1946. (626700.)

15306. Automatic Telephone & Electric Co., Ltd., Terroni, T. B. D., and Cannon, J. R.—Gain indicating and measuring apparatus in carrier current transmission systems. 21st May, 1946. (626701.)

15368. Metropolitan-Vickers Electrical Co., Ltd., Dodds, J. M., and Miller, C. W.—Microwave radar equipment. 21st May, 1946. (626859.)

15852. Standard Telephones & Cables, Ltd., and Gillett, W. F. H.—Light beam indicating apparatus. 23rd May, 1946. (626642.)

16514. Marconi's Wireless Telegraph Co., Ltd., and Forster, H. J.—Measuring instruments for alternating-current voltages and signals. 30th May, 1946. (626709.)

18137. General Electric Co., Ltd., Isaacs, G. G., and Nelson, E. H.—High-pressure electric-discharge lamps. 17th June, 1946. (626951.)

18315. Marconi's Wireless Telegraph Co., Ltd., Walker, L. E. Q., and Boeckstens, R. A.—Printing machines. 18th June, 1946. (626952.)

18462. Ljungstrom, B.—Power plant. 27th June, 1945. (626706.)

20214. Marconi's Wireless Telegraph Co., Ltd.—Navigation aiding radio systems. 29th November, 1941. (626647.)

20395. Compagnie Générale de Télégraphie sans Fil.—High-frequency pulse producing apparatus. 4th March, 1944. (626709.)

20802. Marconi's Wireless Telegraph Co., Ltd.—Navigation aiding radio systems. 20th March, 1941. (626648.)

21012. Standard Telephones & Cables, Ltd.—Radio distance measuring system. 11th August, 1945. (626956.)

21889. Philips Lamps, Ltd.—Electric-discharge tubes, having a secondary-emission electrode. 15th February, 1943. (626710.)

22378. Marconi's Wireless Telegraph Co., Ltd.—Navigating aiding radio systems. 29th November, 1941. (626654.)

23558. Paully, F. G.—Apparatus for measurement of electrochemical potentials. 25th August, 1945. (626962.)

24560. Scophony, Ltd., and Wikkenhauser, G.—Television reception. 17th August, 1946. (Addition to 513776.) (626714.)

24664. Compagnie Générale de Télégraphie sans Fil.—Frequency standards of the tuning fork type. 27th July, 1945. (626965.)

24886. British Thomson-Houston Co., Ltd., Anderson, J. T., and Ward H. F.—Application of powder to a surface. 21st August, 1946. (626657.)

24930. France, H. G. de.—Telecinema transmission installations. 11th October, 1941. (Cognate application 24931/46.) (626715.)

25446. Uttley, A. M.—Radio aids to navigation. 26th August. 1946. (626966.)

25494. O'Brien, W. J.—Receiving apparatus for radio beacon systems. 27th August, 1945. (626870.)

26232. Marconi's Wireless Telegraph Co., Ltd.—Navigation aiding radio systems. 28th February, 1941. (626660.)

27390. Allmanna Svenska Elektriska Aktiebolaget.—Arrangement in remote control systems. 24th September, 1945. (626970.)

29677. Stivin, J.—Electromagnetic induction heating. 6th October, 1942. (626878.)

29765. Williams, W. A. W., and Solley, B.—Ultra-high-frequency wavemeters. 5th October, 1946. (626973.)

31263. British Thomson-Houston Co., Ltd.—Methods of preparing laminations of magnetic materials. 22nd October, 1945. (626885.)

32240 Dings Magnetic Separator Co.—Magnetic separators. 12th November, 1940. (626887.)

32270. British Thomson-Houston Co., Ltd.—Tension control systems. 30th October, 1945. (626721.)

33138. British Thomson-Houston Co., Ltd.—Anode structures for cathode-ray tubes. 10th November, 1945. (626671.)

33292. Philips Lamps, Ltd.—Circuit for regulating

alternating voltage or current. 22nd May, 1943. (626673.)

34674. Sperry Gyroscope Co., Inc.—Voltage regulation of a power supply system incorporating a rectifier. 23rd November, 1945. (626981.)

35514. Siemens Bros. & Co., Ltd., Yates, K. R., and Hensler, B. A.—Telephone systems. 29th November, 1946. (626982.)

36414. Concordia Electric Safety Lamp Co., Ltd., and Cornish, J. P.—Electric batteries. 10th December, 1946. (626678.)

36850. Concordia Electric Safety Lamp Co., Ltd., and Steadman, C. H.—Starting or striking of fluorescent tubes. 13th December, 1946. (626985.)

37039. Electrical Industries, Inc.—Sterilizing device. 5th January, 1946. (626899.)

37259. Philips Lamps, Ltd.—Electric-discharge tubes. 10th September, 1943. (626680.)

37555. G. W. B. Electric Furnaces, Ltd., and McDonald, J.—Electric water-heating installations. 20th December, 1946. (626681.)

38027. Barnes, J. W.—Electric integrators. 30th December, 1946. (626683.)

1947

29. Ellis, G. B.—Timing circuit using a grid-controlled electron tube. 4th January, 1946. (626905.)

917. Leibowitsch, E.—Electro-medical apparatus. 12th January, 1948. (626911.)

1269. Standard Telephones & Cables, Ltd., Hill, S. S., and Cragg, W. D.—Sound amplification systems. 14th January, 1947. (626912.)

1633. British Thomson-Houston Co., Ltd.—Electric water-heaters. 19th November, 1945. (626913.)

2130. Standard Telephones & Cables, Ltd., Wolfson, H., and Shepard, S. C.—Electric resistance bolometers. 23rd January, 1947. (626915.)

2821. Standard Telephones & Cables, Ltd., Wolfson, H., and Shepard, S. C.—Electric resistance bolometers. 29th January, 1947. (626920.)

3373. Broadway, L. F.—Cathode-ray tube apparatus. 5th February, 1947. (626989.)

3582. Marconi's Wireless Telegraph Co., Ltd., and Forbes, I. S.—Frequency discriminator circuit-arrangements. 6th February, 1947. (626739.)

4574. British Thomson-Houston Co., Ltd.—Metal coated non-metallic bodies. 19th February, 1946. (626992.)

5438. Naamlooze Vennootschap Philips' Gloeilampenfabrieken. — Electromagnetic devices. 17th March, 1944. (626746.)

6641. General Electric Co., Ltd., Collett, E. W., Ley, D. A., Mawson, R., Ollerenshaw, C., and Rowlands, R. O. — Multi-channel telecommunication systems. 10th March, 1947. (626750.)

6779. Smith, E. S.—Snap-action electric switch. 11th March, 1947. (626995.)

6967. Turley & Williams, Ltd., Smith, C. D., and Otton, D. H.—Gas or electric cookers. 13th March, 1947. (626753.)

6968. Turley & Williams, Ltd., Smith, C.D., and Otton, D. H.—Gas or electric cookers. 13th March, 1947. (626754.)

6998. Morey, G. H.—Electric heating devices. 1st May, 1939. (626996.)

7323. General Electric Co., Ltd., and Friedlander, E. S.—Electric motor control systems. 17th March, 1947. (626756.)

7803. Teletype Corporation.—Mechanism, particularly applicable to printing telegraph apparatus. 22nd March, 1946. (626999.)

9013. Westinghouse Electric International Co.—High-frequency dielectric heating systems. 3rd April, 1946. (627002.)

9234. Grimwood, C. L.—Electric heating appliances. 5th April, 1947. (626768.)

9981. Mozzanini, G. G., and Lebertre, M.—Direct-current motor control systems. 15th April, 1946. (626775.)

12454. Rotax, Ltd., and Philipp, W.—Electrical means for starting internal-combustion turbines and the like. 8th May, 1947. (626783.)

12892. Standard Telephones & Cables, Ltd., Cooper, A. Y., and McAllan, J. G.—Stabilized electric oscillation generators. 13th May, 1947. (626786.)

13276. Sun-Vic Controls, Ltd., and Davis, N. R.—Electrical recording instruments. 16th May, 1947. (626787.)

13964. Siemens Bros. & Co., Ltd., and Smith, S. C.—Fine adjustment devices 23rd May, 1947. (626790.)

15528. Siemens Bros., & Co., Ltd., and Smith, S. C.—Constructional arrangement for aiding the viewing of a small gap between co-operating electric contact elements. 12th June, 1947. (626796.)

16861. Metropolitan-Vickers Electrical Co., Ltd., and Whyman, F.—Suspension of vehicle bodies. 26th June, 1947. (626798.)

19413. Harbrix Industries, Ltd., Hardie, J. P., and Scarsbrick, R. F.—Electric liquid heaters. 21st July, 1947. (626804.)

20280. Westinghouse Electric International Co.—Power indicating or measuring devices. 18th August, 1942. (626808.)

24071. Austin Motor Co., Ltd., and Highfield, F. W. W.—Power transmission systems for battery driven electrical vehicles. 1st September, 1947. (626820.)

24102. British Thomson-Houston Co., Ltd., and Pohl, R.—Windings of dynamo-electric machines. 1st September, 1947. (626823.)

24368. Crabtree & Co., Ltd., J. A., and Morgan, R. W.—Fused electric tumbler switches. 4th September, 1947. (626829.)

24431. D. P. Battery Co., Ltd., and Robson, R. M.—Electric accumulators. 4th September, 1947. (626832.)

24438. British Insulated Callender's Cables, Ltd., and Bryce, S. J.—Electric connecting device of the plug-and-socket type. 4th September, 1947. (626833.)

24476. Akers, Ltd., J., and Horobin, H. C.—Fittings for fluorescent and other double-ended tubular electric lamps. 5th September, 1947. (626834.)

24489. Glover & Co., Ltd., W. T., Davey, E. L., and Credland, F. R.—Fluid-tight joint for use between the parts of an electric cable system. 5th September, 1947. (626835.)

24524. Cinch Manufacturing Corporation.—Wiring terminal installations. 7th September, 1946. (626837.)

24525. Cinch Manufacturing Corporation.—Electrical wiring terminal installations. 7th September, 1946. (626838.)

24763. Reyrolle & Co., Ltd., A., and Blanch, N. R.—Gas-blast electric circuit-breakers. 9th September, 1947. (626842.)

1948

14885. Raytheon Manufacturing Co.—Magnetrons. 10th March, 1945. (Divided out of 626930.) (627003.)

Amended Specification

594551. Westinghouse Electric International Co.—Power plants, and particularly gas turbine power plants.

Institute of Welding

AFTER falling from 5,115 in 1946 to 4,631 in 1948, the membership of the Institute of Welding increased during the past year and at 31st March last totalled 4,818. The Council has approved the establishment of a new membership class of Companions, which will ultimately replace the present Companion Members.

The annual report of the Council refers to the growth of the Institute's branches, both in activity and number, recognition having been accorded to a new section at Hull, under the Leeds Branch, and to the first overseas branch, in India. Plans have been made for a section of the South London Branch to serve the Medway area.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—MELBOURNE.—24th August. State Electricity Commission of Victoria. 5-ton and 10-ton electrically operated cranes. (See this issue.)

BRISBANE.—7th October. City Electricity Department. Twelve 33 kV oil circuit breakers. C.R.E. (I.B.) 21545/49. Ten/555.)*

Billingham-on-Tees.—U.D.C. Electrical installations in 108 houses on the Belasis Lane estate, Haverton Hill, and 191 houses on the Cowpen Lane estate, Billingham.—F. M. Dawson, Clerk to the Council.

Birmingham.—12th September. Markets and Fairs Committee. Electrical installation at Smithfield Market. (See this issue.)

Bradford.—27th August. City Council. Electrical installations in eighty-two houses, farmhouses with outbuildings, and warehouse, Esholt Village. Engineer and manager, Esholt Hall, Esholt, Shipley.

Cleethorpes. — Corporation. Transformers and/or switchgear for sewerage scheme. (See this issue.)

Hendon.—29th August. Corporation. Street lighting equipment. (See this issue.)

Hitchin.—29th August. U.D.C. Electrical installations for fifty-six houses on Purwell Lane housing estate. (See this issue.)

India.—MYSORE.—31st August. Government Stores Purchase Committee. Three 15,000 kVA power transformers. (C.R.E. (I.B.) 21153/49. Ten/544.)*

Lancashire.—County Council. Electrical installations in schools and supply of 37 refrigerators for day nurseries. (See this issue.)

Leigh (Lancs).—20th August. Lancashire County Council. Electrical installation at Technical School extensions. (5th August.)

Romford. — 1st September. Corporation. Electrical installations in 112 flats. (See this issue.)

Salford.—31st August. City Council. Installation of electric lighting at St. Simon's C.E. School, St. Simon Street. Director of Education, Education Offices, Chapel Street.

South Africa.—DURBAN.—14th October. City Electricity Department. Three 11,000 V oil circuit-breakers. (C.R.E. (I.B.) 21048/49. Ten/543.)*

Uruguay.—MONTEVIDEO. 5th September. Usinas Electricas y Telefonos del Estado. Telephone trunk cable and accessories. C.R.E. (I.B.) 21115/49. Ten/553.)*

Orders Placed

Eccles.—Corporation. Fittings and equipment for modernization of Library lighting (394) G.E.C. Installation of fittings (£65).—N.W. Electricity Board.

Ilford.—Ilford & Barking Joint Sewerage Committee. Provisionally accepted. 600 b.h.p. diesel engine generating set (£11,546).—English Electric Co.

Manchester.—Housing Committee. Recommended. Electrical installations in 78 dwellings in Pott Street and 64 in Sanitary Street.—E. M. Evans & Sons.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Andover.—Infants' school, Portway, for Hampshire E.C.; county architect, The Castle, Winchester.

Barnet.—School, Whitings Hill (£70,350), for Herts. E.C.; county architect, County Hall, Hertford.

Berwick.—Outpatients' dept. at Berwick Dispensary and Infirmary; Oldfield, Simpson and Saul, architects, National Provincial Bank Chambers, Workington.

Birchington (Kent). — Orphans' home (£300,000), for Spurgeon's Homes, London; Woodroffe, Buchanan and Coulter, architects, 5, Bedford Row, London, W.C.1.

Birmingham.—Health centre (£42,000), Kingston Road; city surveyor.

Bletchley.—Permanent houses (40), Manor Farm estate; J. F. Smithie, architect to U.D.C., Council Offices.

Boreham Wood.—Houses (2,000) for L.C.C.; Gee, Walker & Slater, Ltd., builders, 100, Park Lane, W.1.

Brighton.—Houses (520), Parkside estate extension; borough engineer.

Bristol.—Factory on site off Princess Road; Walton, Goody and Cripps, Ltd., marble merchants, 13, South Wharf Road, Paddington, London.

Primary school, Cedar Park, Stoke Bishops'; Kenneth Nealon, architect, 7, St. Stephen's Street.

Bromley.—Flats (30), Tylney Road; H. Payne Wyatt, Son & Partners, architects, 463/5, Brixton Road, S.W.9.

Bromsgrove.—Houses (26), Orchard estate; S. J. Smith & Co., builders, Wednesbury.

Bury.—Houses (28), Hare Drive; borough engineer.

Chelmsford.—Block of shops and flats, Melbourne estate; E. R. Collister, architect, The Institute, London Road.

Cheltenham.—Houses (94) and flats (40); borough surveyor.

Cheshire.—New schools, Lacy Green, Wilmslow, and Lower Bredbury; E. Mainwaring Parkes, county architect, The Castle, Chester.

Chester-le-Street.—Houses (268), Hilda Park estate; William Leech, Ltd., builders, 2, Clayton Street, Newcastle-on-Tyne.

Houses (65) on the Red Rose Hall estate; H. E. Pitt, Ltd., builders, Millfield, Sunderland

* Specifications may be inspected at the Commercial Relations and Exports Department, Thames House North, Millbank, S.W.1.

Darlington.—Proposed developments at Darlington Memorial Hospital and Maternity Hospital; Saxon, Snell and Phillips, architects, 9, Bentinck Street, London, W.1.

Houses (150), Cockerton; borough architect, Central Buildings.

Dewsbury.—Hostel for the blind, Highfield House, Soothill Lane; Dewsbury and Batley Institution for the Blind.

Ealing.—Extensions to Technical College (first section); C. W. Radcliffe, clerk, Guildhall, Westminster, S.W.1.

Ewell (Surrey).—Technical college and art school, Priest Hill; J. Harrison, county architect, County Hall, Kingston-on-Thames.

Kirkburton.—Houses (22), Highgate Lane, Lepton, for U.D.C.; Clifford Hickson, architect, 4, St. Peter's Street, Huddersfield.

Leicester.—Junior school, Mayflower Road; city architect.

Lichfield.—Houses (72), for R.D.C.; A. T. & Bertram Butler, architects, 14, Waterloo Road, Wolverhampton.

London.—STOKE NEWINGTON.—Home for aged, Woodberry Down (£75,168); Henry Boot and Sons, Ltd., builders, Kensington.

BERMONDSEY.—Rebuilding church hall and clubroom, Melior Street; H. S. Goodhart Rendel & Partners, architects, 13, Crawford Street, W.1.

FOREST HILL.—Two blocks of flats, Devonshire Road, for Lewisham B.C.; M. H. Forward, borough architect.

Luton.—Conversions and adaptations, 63/69, Guildford Street, for offices; borough engineer, Town Hall.

Houses (120), Farley Hill estate; borough engineer.

Manchester.—Houses (220), Woodhouse Park and Moss Nook; city architect.

Margate.—Factory premises, Ramsgate Road industrial estate; Pioneer Welding Co., Woodside Gardens, London, N.17.

Mellis (Eye).—Primary school for East Suffolk; E. J. Symcox, county architect, County Hall, Ipswich.

Middlewich.—Houses (48), Warmingham Lane estate; R. J. B. Wilkinson, surveyor, Victoria Buildings.

Northolt.—Five blocks of flats, Church Road; G. Reed, 8, Corfton Road, Ealing, W.5.

North Shields.—Sweet factory, office and warehouse, Bird Street, for Scott and Son; J. R. Wallace, architect, Northumberland Square, North Shields.

Portsmouth.—Engineering and building laboratories, drawing offices, domestic science department, etc., at Technical College Annexe, Anglesea Road, for E.C.; city architect, 1, Western Parade, Southsea.

Central pathological laboratory at the Infectious Diseases Hospital; South-West Metropolitan Regional Hospital Board, 11a, Portland Place, London, W.1.

Redhill.—Factory; White, Cottell & Co., 143, Neate Street, S.E.5.

Rochdale.—Houses (154), Kirkholt estate; J. Hobson & Sons, Ltd., builders, Nottingham.

Salford.—Police headquarters, The Crescent; city engineer, Town Hall, 3.

Sheffield.—Secondary technical school, Jordanthorpe; W. George Davies, city architect, Town Hall.

South Shields.—Houses (78), Lizard Lane; Henderson Bros., builders, Smith Street, Tyne Dock.

Old people's hostels on the Marsden and Simonside estates; borough engineer.

Southport.—Extensions to Technical College (£109,000); R. E. Perrins, town clerk, Town Hall.

Standish with Langtree.—Houses (22), Grove Lane site; J. Brookes, engineer and surveyor to U.D.C.

Stanmore.—Houses (128), London Road, for Harrow U.D.C.; A. W. Kenyon, architect, 15, Adeline Place, W.C.1.

Swansea.—Works, etc., Crymlen Burrows; Hughes, Morgan & Co., Ltd., Burrows Yard, Port Tennant.

Tynemouth. — Infants' school, Marden Avenue, Cullercoats; J. W. Summers, quantity surveyor, 61, Westgate Road, Newcastle-on-Tyne.

Home at Marden for 35 old people; borough engineer, 19, Howard Street, North Shields.

Wakefield.—Laundry at Grantley Street for Steam Laundry, Ltd.; E. W. H. Powell & Co., consulting engineers, 70, Llandaff Road, Cardiff.

Flats (24), Langdale Square; city surveyor.

Walsall.—Houses (90), Alumwell Road; borough engineer.

West Bromwich.—Factory, Birmingham Road; Bate & Goode, Ltd., 372, Park Road, Birmingham, 18.

Winchester.—County office buildings, Westgate, for Hampshire C.C.; C. Cowles-Voysey, architect, 2, Bunker's Hill, London, N.W.11.

Wisbech.—Permanent houses (42), Mount Pleasant-Bath Road estate; Gordon J. Wootton, borough engineer, Exchange Square.

News from Australia

From a Correspondent

TO ease the load on East Perth power house, the Western Australian Cabinet has agreed to the purchase of three 1,000 kW diesel generating sets from the United States. These are to come from the works of General Motors, Ltd., at Cleveland, and the first should be shipped this month. There has also been talk of purchasing an old battleship, the steaming section of which could be used for an emergency plant, but so far it seems that the difficulties of such a proposition far outweigh the benefits.

The Western Australian Cabinet has also approved the expenditure of £287,266 for the supply and installation of a pulverized fuel-fired boiler and switchgear for the "B" station at East Perth. These will be supplied by International Combustion, Ltd.

Premier Hollway, of Victoria, announces plans for an underground railway for Melbourne. The proposed line is expected to cost some £10,000,000, but the Railway Commissioner (Mr. R. G. Wishart) says that before this undertaking can be put into being "millions of pounds worth of other urgent railway works will first have to be completed."